Featuring Gearsets, Clutches and Steering Gears

MOTOR AGE

Vol. XXX
No. 20

CHICAGO, NOVEMBER 16, 1916

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Stronger Than Ever

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Vol. XXX No. 20 Chicago, November 16, 1916 $3.00 Per Year

MOTOR AGE

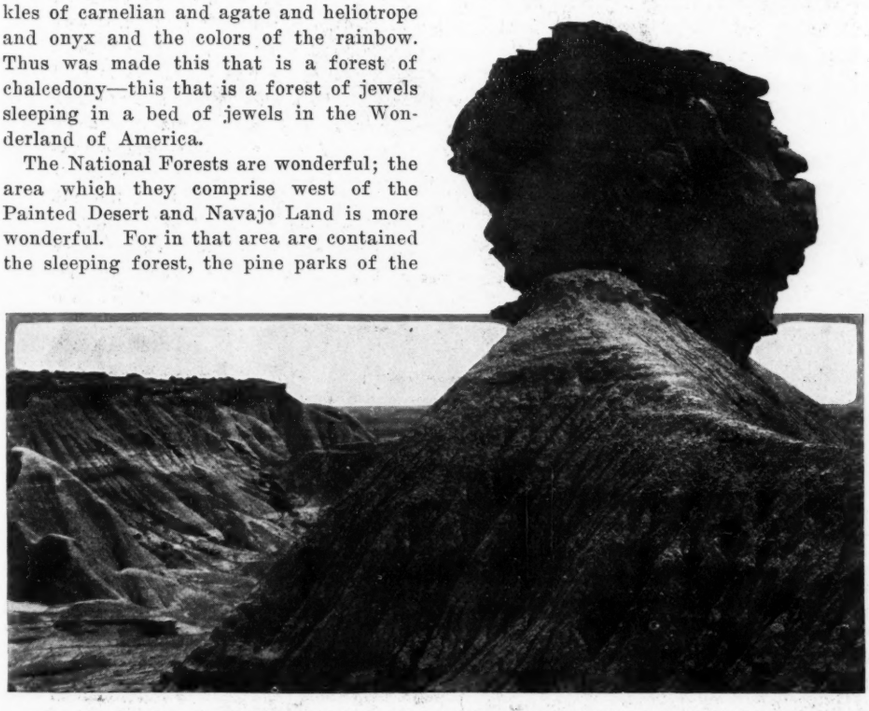
The Forest of Jewels

By Ruth Sanders

SOME folks call it a forest of chalcedony—this forest that lies sleeping in a bed of a thousand jewels. Centuries ago, a million years or so, it was like other forests with huge uplifted trunks and branches of the more majestic tree kind. Then came a deluge of sand and flood to overwhelm the mighty sequoias and transform the beauty of tree into the beauty of jewel, into the beams and sparkles of carnelian and agate and heliotrope and onyx and the colors of the rainbow. Thus was made this that is a forest of chalcedony—this that is a forest of jewels sleeping in a bed of jewels in the Wonderland of America.

The National Forests are wonderful; the area which they comprise west of the Painted Desert and Navajo Land is more wonderful. For in that area are contained the sleeping forest, the pine parks of the Francisco mountains, the unhunted game resort of the White mountains, the Grand Canyon, the Aztec ruins of Montezuma's Castle and Montezuma's Well, the natural bridge of southern Arizona and the great crater-like cavity supposed to mark the fall of a huge meteorite near Winslow.

The National Old Trails highway will lead you through the bejeweled timbers on its way to the ocean. The forest is a mere 10-mile drive from Holbrook, Ariz. The motorist will find its wonders easily accessible; in fact, he cannot miss them if he but follow the main highway. And he will find not an intoxication of color such as is in the Painted Desert, whose southern borders he will skirt on the way, but a mystery of color.



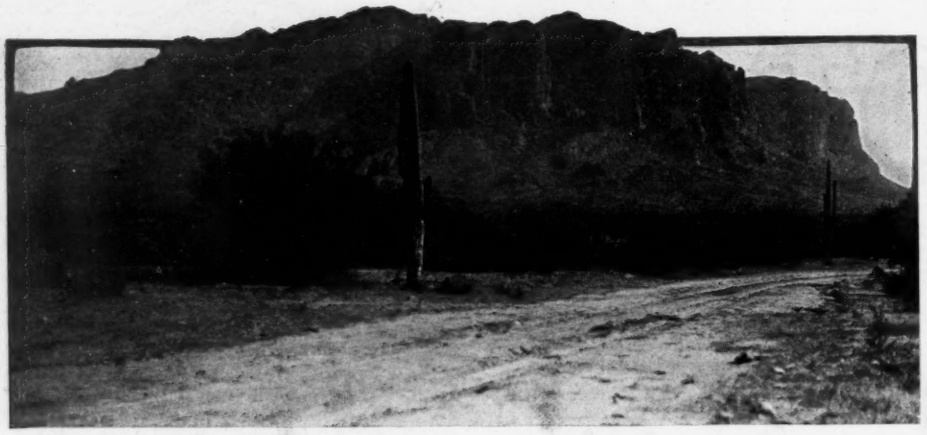
America has her own Sphinx, and it is only one of many mysteries that await the motorist in the West

A mystery of geology as well as of color is it. The trees fell not in criss-crossed and huddled heaps but in orderly rows and according to the place in which they grew. Scientists have found some willows among them. Think of a willow in agate!

Arizona Forest Excels

Other similar deposits of silicified wood adorn both Europe and the West, but for variety of color and extent the forest in Arizona surpasses them all. In the east fork of the Yellowstone and the high plateaus of southern Utah, such deposits are found in small quantities. Segments are scattered throughout all northern Arizona, but grouped together in Apache county are vast deposits of petrified wood so varied they range in size from marbles to 200-foot trees and in color from the dull blues of clay banks to the vivid flashes of bloodstones and crimson roses.

The jewels of this sleeping forest are set in a circle of cliffs and cut by ravines and sloping mesas with shale, clay and sandstone engravings. Only theory tells how long since green trees grew upward here. Before the plain was a sea. Before the sea was a forest of sequoias. A sequoia grows for 6,000 to 10,000 years. Did it all start at the beginning of time? The cliffs show marks of the shores of the sea which once flowed within the circle of cliffs. Two-



A fair example of the road to the Petrified Forest. It is guarded by cacti and watched over by the mountains in the distance. The trunk to the right is seen at the end of the road. It is a pity its color cannot be shown also. All the hues of the rainbow help engrave the marks of the ages that have passed over the sleeping trees

hundred-foot trees of agate bury their roots in the sand and rock. That they were full-grown is evident, though no excavations have been made to discover their height when living.

Hundreds of volcanic cones and mineral springs show that it was a warm sea that helped form the pickling-plant which changed the wood of the forest into the adamant of the diamond. The trees were mowed by an orderly force, then changed to jewels, which were broken later by various shocks of quake and frost.

Jewels Lie in Chips

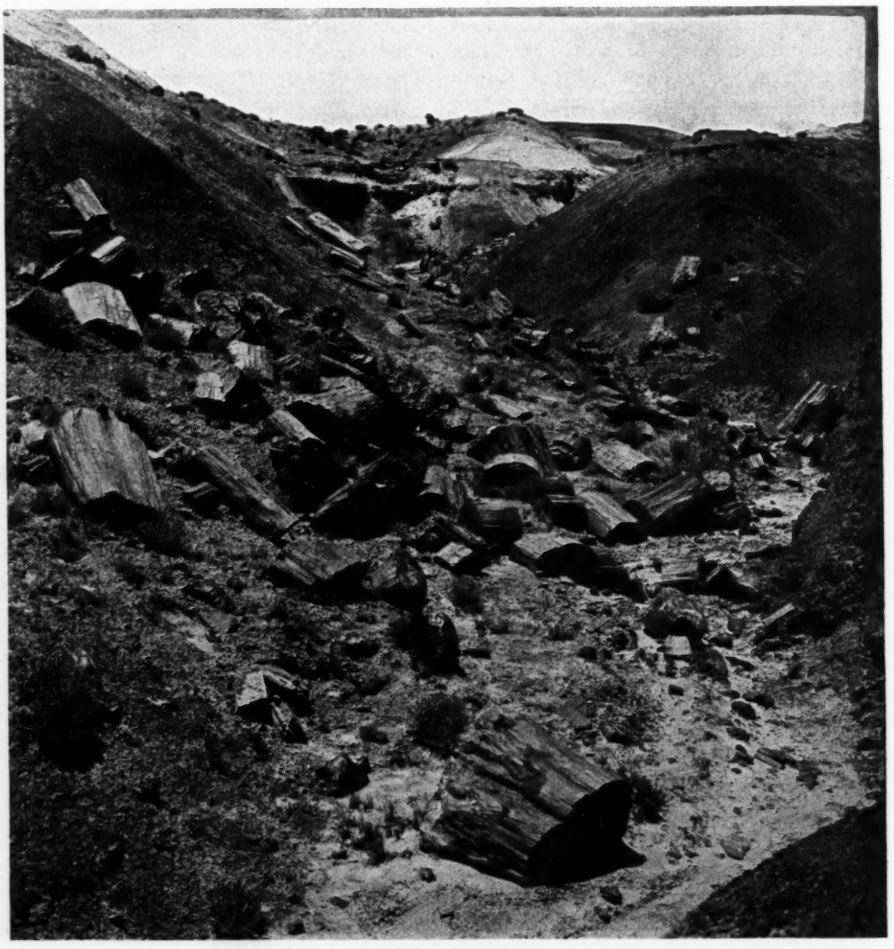
Not the least of the jewels are the chips which cover the bed of the sleeping forest. Stray bits of agate and onyx glisten with light and color. Blocks, trunks and branches lie as felled by the elements, interlaced with rainbow pieces of moss-agate and topaz. These stones are of the hardest in the world. Their very nature guards them against exploitation, for it takes as expensive instruments to polish them as the diamond. Museums contain specimens of the highly polished stone, which are as valuable as more usual gems for this reason. Thinly-cut sections reveal the wonders to be found better perhaps in the chips which sparkle nearby the great bodies of the fallen monarchs and which glisten like dewdrops as one picks them up by the handful and lets them slowly trickle through the fingers.

A cross section of a tree trunk shows every grain of the former wood, grains worked out in a prismatic mosaic of blue and gold and purple and lilac and pink in concentric circles of color. A lengthwise section shows waves of color of pastel hues. True, no color of the intenseness and dominance of that in the Painted Desert is here, but if you care for the more fragile, more delicate, more appealing colors, this forest of jewels offers them without grudge. A rain intensifies the color, and the chips will glisten and sparkle more than ever. The chips are everywhere —star dust in earthly heavens.

If you wish you can visit a natural bridge of jewels, something you can find nowhere else on the face of the globe probably. In the so-called First Forest—there are five tracts altogether—a jasper and agate pathway cements the sides of a 50-foot chasm over a three-fringed pool. The bridge is 130 feet long, the trunk, or maybe it is only a part of the trunk, of a single tree. Peculiar formations bear the names of "Eagle's Nest," "Snow Lady" and "Dewey's Cannon." The "Twin Sisters" are in the tract 2½ miles south of the First Forest. This latter tract has few formations; its jewels are mostly trees, and it has 2,000 acres of them.

Color Names Rainbow Forest

Eighteen miles southeast of Holbrook is Rainbow Forest, locally named thus for its wide range of light and color. Several hundred whole trees lie here. Some of them are more than 200 feet long. They



Gulleys are filled with blocks of agate and chips of onyx, the rubbish of a jeweled family

are partly embedded in earth, and no one can be sure how tall they were.

The Blue Forest is the smallest tract. North Sigarilla, about 22 miles northeast of Holbrook, contains finely preserved specimens of a carboniferous period and is scattered over the bottom and sides of a wide, shallow canyon, which differs from other canyons with its buttes and mesas of colored clay and rock.

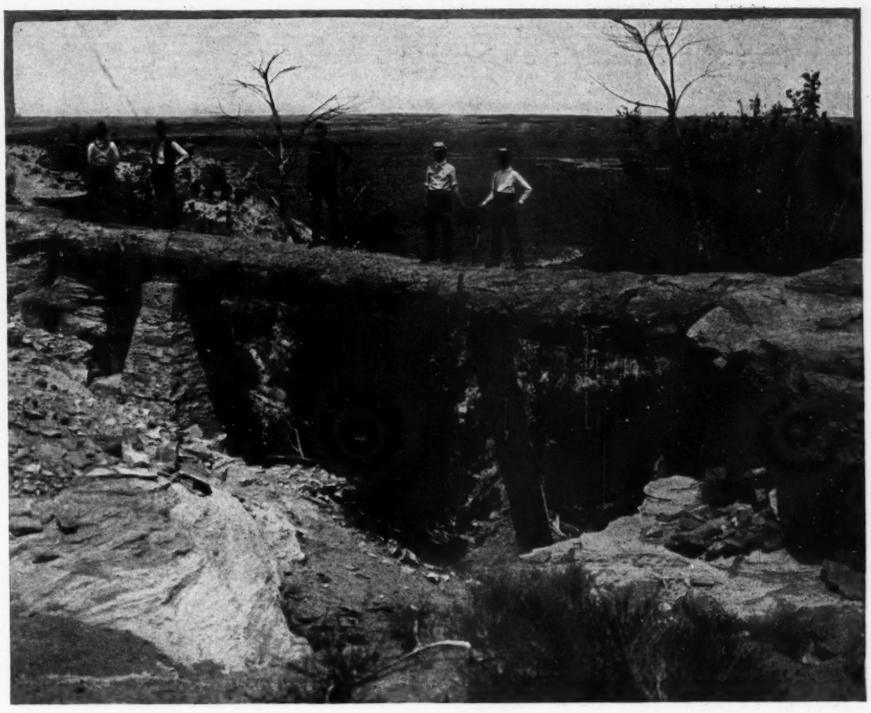
You will find in the forest of jewels aeons of memories. You will find such trunks of trees, such precious chips of color and such iridescent pathways as you can find nowhere else. The wonders of these have lain beneath the skies of Arizona since long before man and his petty discoveries. It is with the wisdom of all these ages that the fallen monarchs lie waiting for you in their dream-encrusted sleep.

Indian Ruins Are Near

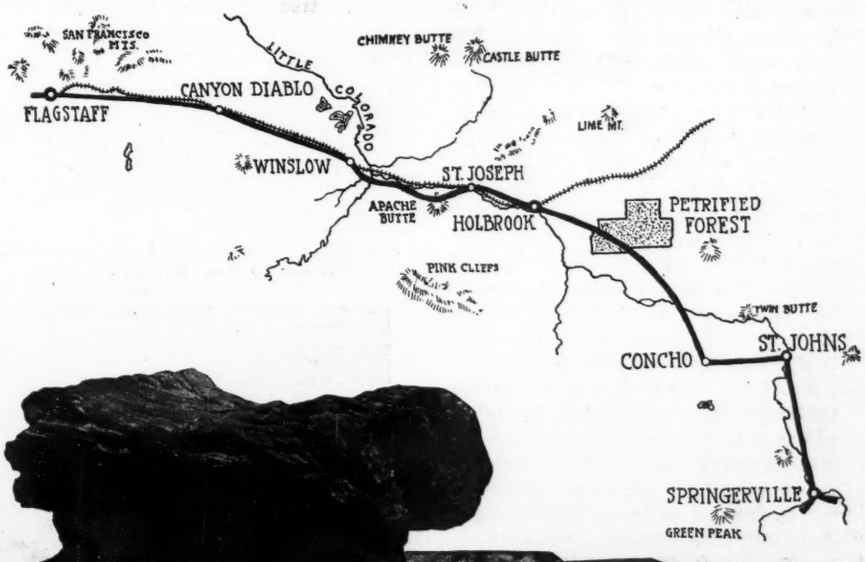
Ruins of prehistoric Indian settlements are in the vicinity of the forest of jewels. About a mile from the natural bridge are the ruins of a pueblo with its plaza surrounded by tiny houses and a tiny graveyard. In the northern part of the forest are the ruins of a dwelling built of petrified wood; another lies just 18 miles away in the forest. The Indians found the forest of jewels rich in arrowheads and speartips and ornaments, and some of their ancient tribesmen must have found it rich in homes.

The Aztec ruins and hieroglyphics are the oldest ruins. Walls of stone and mortar mark the numerous dwellings which once edged a plaza 130 by 210 feet. Near the plaza's center is a small kiva, or underground ceremonial chamber, with flagstone flooring still intact. A mile or more of hieroglyphics, difficult to decipher, are cut in a cliff not far away. There is some cause to believe that petrified wood, instead of metallic instruments, was used to peck the inscriptions into the rock.

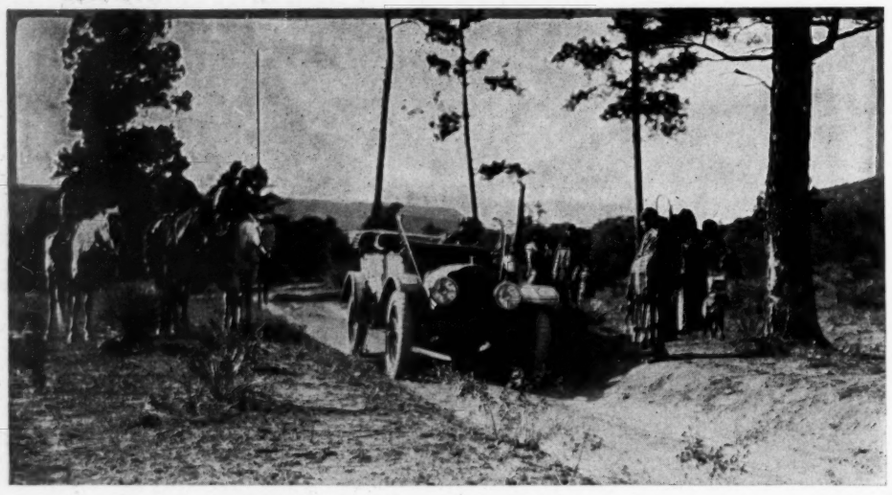
Montezuma's Well and Castle are best reached from Flagstaff, 100 miles from Holbrook. At Flagstaff are the snow-capped peaks of the Francisco mountains,



The bridge is of common knowledge. Many a time have you crossed over a lately fallen path of this kind, but seldom over one which has been there for centuries



The jewels lie prostrate and in neighborly groups sometimes. But often they form cannons such as the illustration to the right shows



In your motoring you will meet the Apaches of modern days, and perhaps they will be traveling in groups as in the old days

set in between the Painted Desert to the north and the arid plains to the south and ranging from 12,000 to 13,000 feet in height. Twenty miles from their lofty peaks is Oak creek, famous for its trout brook, and 25 miles away is East Verde, from which place you go to the natural bridge of southern Arizona, with its central span of 100 feet from creek bottom. There, too, are petrified deposits. The creek carries so much lime and so rapidly that if you drop an article down into the water the article at once is encrusted and becomes petrified.

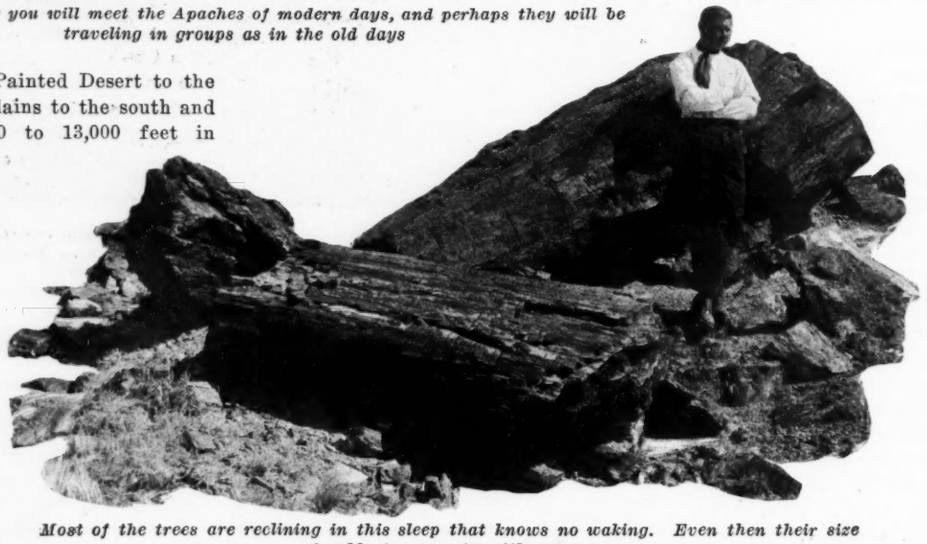
So, if you do not find ample wonder in the forest of jewels—it is a big "if," I admit—just within hailing distance are other wonders, not so well known as they might be, which will bear acquaintance, not to mention the more widely told marvels of Painted Desert, Grand Canyon, Pueblo and National Forests.

One Approaches Thus

Motoring westward across the continent, one approaches the Petrified Forest from Springerville by following the windings of the little Colorado river over the rolling, arid plains to about 10 miles east of Holbrook. There you will enter the borders of the forest, the forest without a single leaf and carpeted, as no other forest is carpeted, with agate chips and onyx trunks of dead giants who grew for thousands of years before their "untimely" death. The color is wonderful. As you were told before, it is not of the intoxication of that of the Painted Desert, but none the less mysterious and alluring, and the greatest wonder of it all is: How did these rainbow tints get there and what holds them captive?

Motoring eastward across the continent, one approaches the Petrified Forest from Holbrook by following the road across the rolling stretches of arid plains for 10 or 15 miles. The journey from Holbrook is southward over a smooth road, a natural highway to start with and now the fraction of a great coast-to-coast road. Wind and travel have packed it hard in places, as hard as any modern road machinery could have made it. No grass appears, except stray tufts. Rocks and sand and sky, an occasional Indian and a ruin or so, together with lava fragments thrown out centuries ago from now extinct volcanoes, border the path. Aromatic sage odors fill the air of the dry plain, which becomes broken country and sandy arroyos and gravely hillocks. Rainbow spangles and huge blood-colored rocks greet the eye on arrival, becoming on closer inspection trees of jewels with stone bark encrusted and filled with hearts of pure onyx and agate.

You can spend 3 hours or 3 weeks in the forest of jewels and not see all its colors and color formations, they change so rapidly. Whether you merely pause or spend days there, however, it is worth while.



Most of the trees are reclining in this sleep that knows no waking. Even then their size is able to compete with mere man

the upper road is made of volcanic ashes. The lower photograph not only shows the good road just out of Springerville but the huge flocks of sheep that range the level country in that region

$500 Electric Possible

New Type of Utility Vehicle Seems to Presage Coming of Low-Priced Variety

Dr. Steinmetz Dream May Be Realized—To Exhibit at Show

NEW YORK, Nov. 10—The low-priced electric utility vehicle which Dr. Charles Steinmetz, engineering authority of the General Electric Co., has been advocating for several years seems near the point of realization. Such a vehicle will be manufactured by the Dey Electric Corp., with offices at 45 Broadway. This concern has engaged show space for the Grand Central Palace show where these new electric vehicles will be on display, and it is planned to have production under way for the 1917 market.

A comprehensive line of what is described as the lightest, lowest-priced and highest-efficiency electric vehicle ever built will be manufactured. The Dey company has secured a factory in the metropolitan zone, and will specialize on a runabout intended primarily for utility work such as solicitors, etc. The car is not a passenger type, nor yet a truck, but essentially a utility vehicle. In addition to this runabout a closed type of passenger vehicle will be produced. The company will manufacture what might be termed a utility chassis suitable for taxicab purposes, as well as passenger bodies and light truck uses.

Will Be Seen at Show

That the designs of this lowest-priced electric are practically completed is apparent in that the cars will be at the New York show. That the company will go forward with an interesting manufacturing program is also apparent in that it is strongly financed and presumably closely connected with one of the large electrical manufacturers.

The dream of the $500 electric, as it was styled 2 years ago, has been a cherished matter with Dr. Steinmetz. It has been known for several years that he has been perfecting features of design which would make it possible to produce a utility electric vehicle at practically the same price as the cheaper gasoline machines. Dr. Steinmetz strongly advocated this type of vehicle before the different electric interests, as well as before the electric vehicle manufacturers. It was generally considered impossible to build such a vehicle that would give the desired service. The possibility of producing such a vehicle resulted in many strenuous arguments on convention floors, between central station concerns, or companies manufacturing electric current, and those engaged in vehicle manufacture. The central station interests were strong for such a vehicle as it would naturally be a great source of revenue if manufactured in large quantities. On the other hand electric vehicle makers were catering to public requirements for larger and more luxurious types of electric vehicles.

The price of the new lowest-priced electric to be built by the Dey corporation has not been determined, but it is understood that it will be under $1,000 and that eventually the dream of Dr. Steinmetz for a $500 vehicle may be attained, if not carried further.

COLE NEW PRICE, $1,695

Indianapolis, Ind., Nov. 10—Beginning January 1, the price of the Cole eight touring car and roadster will be advanced $100, giving both models a selling price of $1,695.

BREWSTER INCREASES CAPITAL

New York, Nov. 10—Brewster & Co., Long Island City, N. Y., has increased its capital from $2,000,000 to $2,500,000 to provide funds for the manufacture of a chassis for its cars, formerly imported from England and France.

PHILIP BRAENDER DIES

Rutherford, N. J., Nov. 10—Philip Braender, president of the Braender Rubber and Tire Co., this city, died November 4 at his home in White Plains, in his sixty-eighth year.

WHITE CO. RAISES DIVIDEND

Cleveland, O., Nov. 11—The White Co. has increased the dividend rate on the company's capital stock from 7 to 8 per cent, and has declared a quarterly dividend of $1 a share payable December 31 to stockholders of record December 15. Heretofore dividends were 75 cents a share, the par value of which is $50.

CORNELL COLE SALES ASSISTANT

Indianapolis, Ind., Nov. 11—Fred A. Cornell, formerly in charge of Willys-Overland service department and since then in charge of the heater department of the Perfection Spring Co., has been made assistant sales manager of the Cole Motor Car Co., in charge of the service department.

VER LINDEN NEW OLDS PRESIDENT

Lansing, Mich., Nov. 10—E. Ver Linden, former general manager of the Olds Motor Works, has been elected president. Mr. Ver Linden has been in the motor car business for a number of years. He joined the Olds organization in 1912 and previously was production expert for the Buick company as manager of plant No. 1. He at one time was in business for himself, under the corporate title of the Michigan Auto Parts Co., which was bought by the General Motors Co. in 1909.

Salon to Be Larger

Balcony of Hotel Astor to Be Used for First Time as Exhibit Space

May Be Twenty Exhibitors When All Have Signed Up

NEW YORK, Nov. 13—January 2 to 10 is the date for the 1917 salon, the exhibition of high-grade motor cars held annually in the grand ball room of the Astor. For the first time in the 5 years that the salon has been held at the Astor, the balcony will also be used for exhibition purposes, there being a marked increase in the number of exhibitors.

Until the allotment of space is made the list of exhibitors will not be announced, but there will be a dozen or more on the main floor as heretofore and from four to eight exhibitors in the balcony. Tire and accessory exhibits will be shown in the promenade at the rear of the main floor. Most of the American makers of high-grade, and consequently high-priced motor cars, are among the exhibitors. The increase in the number of exhibitors is confined to domestic manufacturers, the European representation being the same as last year.

DOLBEER OVERLAND TREASURER

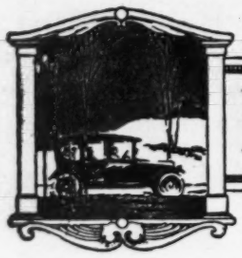
Toledo, O., Nov. 10—Frank K. Dolbeer, formerly of the financial department of the Victor Talking Machine Co., has been made treasurer of the Willys-Overland Co., succeeding Walter Stewart, who has resigned. Mr. Stewart remains a director of the company.

HESS-BRIGHT CONTROL PASSES

New York, Nov. 10—Control of the Hess-Bright Mfg. Co., Philadelphia, Pa., manufacturer of ball bearings, has been secured by a group in New York and others who also own the S. K. F. Ball Bearing Co., Hartford, Conn.

In spite of this passing of control the Hess-Bright company will continue to be operated quite independently of S. K. F., and its manufacturing facilities will be materially increased. B. D. Gray remains president of the Hess-Bright company and retains his stock. F. E. Bright, one of the Hess-Bright organizers, has retired from active participation, but continues as chairman of the board of directors.

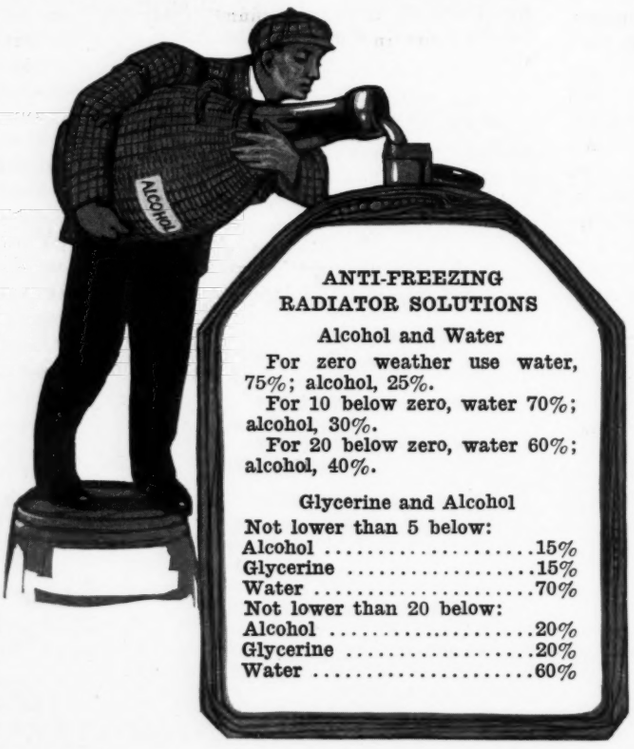
With the purchase of Hess-Bright company goes the now celebrated Conrad patent, which was adjudicated in the courts a year ago and which patent has been a valuable asset of the Hess-Bright company. Several bearing concerns have been licensed by Hess-Bright under this patent, these including New Departure Mfg. Co., Standard Roller Bearing Co., Gurney Ball Bearing Co., U. S. Ball Bearing Mfg. Co. and Fafnir Bearing Co.



EDITORIAL PERSPECTIVES

Anti-Freezing Compounds

APPROACH of cold weather, particularly in the northern states, brings up the question among motorists of the best method of preventing freezing of water in the radiator, with its attendant trouble and expense resulting from cracked cylinders, radiator or pump. There are a number of solutions which may be used to lower the freezing point of the water in the circulating system to practically any required degree and, at the risk of repetition, Motor Age is giving herewith a few of the more widely approved solutions of alcohol and water and alcohol, glycerine and water, together with their freezing points.



ANTI-FREEZING RADIATOR SOLUTIONS

Alcohol and Water

For zero weather use water, 75%; alcohol, 25%.

For 10 below zero, water 70%; alcohol, 30%.

For 20 below zero, water 60%; alcohol, 40%.

Glycerine and Alcohol

Not lower than 5 below:

Alcohol	15%
Glycerine	15%
Water	70%

Not lower than 20 below:

Alcohol	20%
Glycerine	20%
Water	60%

IN general, the solutions in which alcohol and glycerine both have a place may be considered as the best among those which the car owner may compound for himself. There are a number of proprietary compounds upon the market, most of them good and most of them having glycerine and alcohol in their makeup. So far as expense goes, the proprietary compounds can be obtained at most supply stores or in ready mixed form from garage men almost as cheaply as if the owner were to purchase the material separately and mix them himself. However, the home mixture has the advantage that the motorist is sure he has the proper proportions for his local weather conditions providing he follows an authoritative formula and uses care in compounding the mixture.

WHEN both glycerine and alcohol are employed in the proper proportions, the expense is much lower than that of glycerine alone, the effect on the hose connections is negligible and the evaporation of the alcohol is lessened very much. Alcohol may be either of the wood or grain variety, and pure or denatured. Grain alcohol undoubtedly is the best because purest, also it is the most expensive and it is doubtful if the difference in the action between undenatured grain alcohol and commercial denatured alcohol is sufficient to make up the difference in price. Unbleached glycerine, which may be procured at almost any drug store, is cheapest and best.

THERE is a number of solutions which have been tried from time to time as substitutes for those mentioned, but few, if any of them, are really satisfactory. Calcium chloride, in fact, all soluble salts, are taboo because of their harmful action on the metal, particularly the copper and zinc in the radiator. Kerosene has been tried but it is not satisfactory on account of the disagreeable odor when warm. The cylinder oils and other oils when used to replace the water will usually serve sufficiently well as cooling mediums in the winter time but, like the glycerine, destroy the rubber.

NO attempt should be made to introduce anti-freezing solutions into the storage battery because anything of the sort will either cut down the action of the battery or destroy the plates. The one and only thing to do to prevent storage battery freezing is to keep it well charged. A fully-charged storage battery will not freeze at any temperature likely to be encountered within the confines of this country. But if it is not over one-half charged, it is in danger of freezing in really cold weather. The best insurance against freezing up the battery and thus ruining it, is to keep it fully charged.

Transmission and Steering Development

IT is a very encouraging commentary on the status of design of the clutch and gearset features of the transmission system of the present day motor cars that there is not a great deal to be said in detailing the new construction of these features of the chassis for the new season. When an industry, or a portion of it, reaches a stage in which there is little change from year to year it may be taken for granted that one of two things have occurred. Either it has subsided into a state of dry rot in which very little thought is being centered upon it and very little experimental work is being done, or else it has reached a state of near perfection such as to make any radical change without going backward involve complete redesigning along new lines and involving new principles.

IT is a certainty that there is no branch which can be accused of being in a state of dry rot in an industry which has been making strides at the rate the motor car industry has done. It is to be assumed that little if any change of a radical nature is to be expected in the construction of gearsets, clutches and steering gears for sometime to come unless the unexpected happens and some designer comes forward with developments along new lines of compelling value which would cause the present designs to be discarded. It is true enough that there have been minor refinements along a number of lines during the past season in clutches, speed-changing units and steering units but these have all been the result of painstaking experimentation based on the fundamentals of present and past practice.

Fruit Assembling Plant Is Garagemen's Hobby

GARAGE owners, named Hall, in the village of Ganges, Allegan county, Mich., have established one of the oddest and most profitable assembling plants to be found where power trucks abound.

The Halls have built a better building than they need to handle a garage business. It is constructed of concrete blocks and has a concrete floor.

These men do not collect parts of cars and put them together; they assemble filled fruit packages and form an important link in the transportation route to market. They induce farmers within a radius of a few miles to haul small loads of fruit to their big garage. Then they put big loads of it on a power truck and run it to the terminal of an interurban line to Saugatuck, where it is loaded into a freight car, which in turn runs 20 miles to the interurban pier in Black lake to load into one of the Holland steamships for transfer across Lake Michigan to Chicago.

The garage owners share in the freight charges to an extent that makes it profitable to engage in this side line. They have a good shop in connection with the garage and thus are able to keep their cars on the go every shipping day. The fruit growers find it cheaper to send to ships in this way than to haul it themselves.

COW COMMITTED SUICIDE?

Hamilton, Ont., Nov.10—On the plea that the cow his machine struck "deliberately committed suicide," a defendant in a local court sought to be relieved of paying $60 damages brought by the owner of the purveyor of lacteal fluid. The defendant averred a little boy struck the cow with a stick as he was approaching and thus caused the cow to plunge head on into the car. Inasmuch as the said boy could not be produced, and also that it is common knowledge that cattle grazing along the public highways are liable to step in front of passing vehicles, the judge dismissed the case.

WISCONSIN CONVICT LABOR

Convict labor on public highway improvement work proved such a success in Wisconsin this season that the Wisconsin state board of control is considering plans for continuing the practice on a much larger scale in 1917 and succeeding years. Forty inmates of the state prison were placed in road camps this year, the counties paying for the labor in contracts with the state board. Not the least trouble was encountered in handling the men or obtaining proper results from their labor, and in fact it is said that the plan proved even more successful than work under private contracts. There is a large demand for convict labor on highway improvement, one county having put in a requisition for 200 men. In addition to working convicts on the roads, the state board has placed 200 convicts at work on the construction of a $2,000,000 home for the feeble-minded, the new tuberculosis camp, and the new reformatory for women in Wisconsin.

A campaign has been started in California against people who throw bottles or any kind of glass on the public highways, thereby causing an enormous amount of punctures and blowouts. Committees have been formed, moving pictures taken and much sentiment in favor of a law declaring such people public nuisances has been created. The agitation was started by George I. Lufkin, Pathfinder distributor in southern California.

SIX HENS HELD ABOVE FORD

It is a greater crime in Greene county, Illinois, to steal six hens than to steal a Ford. Juries in the Carrolton circuit court have so decided.

One culprit was tried for stealing the six hens from a farmer near Roodhouse. The other was tried for taking a farmer's Ford. The hen thief was given a sentence of 90 days. The Ford thief was left off with 60 days in jail.

Egyptian Tongue Has Peculiar Motor Signals

THE Australian Motor Transport Service, which is stationed at Gamrah, Cairo, Egypt, has written the Willys-Overland Co., Toledo, O., telling of the service Overland cars are giving and among other things, says:

"Up to a short time ago there was no speed limit in Cairo, and we used to drive the cars at a tremendous rate. When we were stationed at Heliopolis, about five miles from Cairo, we would have races into Cairo. It was no uncommon sight to see 15 or 20 ambulances tearing along the main road to the city.

"But now we have a speed limit, which is being tightened almost fortnightly. The best run we now have is to a place called Helousan, about 25 miles from Cairo. The road follows along the banks of the River Nile, practically the entire way.

"One soon picks up the Arabic language, especially enough of it for motoring purposes. Such essentials as 'Imshi': 'Go away'; 'Yemeenak': 'Get over to the right'; 'Shamalak': 'Get over to the left'; 'Oak': 'Look out'; 'Oak rigglak': 'Look out for your feet,' are enough for an ambulance driver's practical purpose.

See America First — See America Now

NO. 98—INDIAN PRAYER ROCK, MOBRIDGE, S. D.

THE superstitious Indian prays before strange objects. Here is the prayer rock of the Sioux, at Mobridge, S. D. The finger prints were chiseled in the rock by one of Sitting Bull's followers.

EDITOR'S NOTE—This is the ninety-eighth of a series of illustrations and thumb nail sketches of the scenic and historic wonders of America to be published in Motor Age for the purpose of calling the attention of motorists to the points of interest in their own country.

Conflict of Authority in Grand Prize

A. C. A. and A. A. A. in Uproar Over Jurisdiction and Certain Rules

LOS ANGELES, Cal., Nov. 13—Special telegram—Conflict of authority between the Automobile Club of America and the American Automobile Association in connection with running the Vanderbilt and Grand Prize races next Thursday and Saturday, respectively, on the Santa Monica course is causing considerable speculation as to the possible outcome. William K. Vanderbilt has sent a telegram of several hundred words to the Santa Monica Chamber of Commerce quoting the resolution of the Automobile Club of America saying that the Grand Prize can be run only by complying with the rules of that organization. Among other things he specifies the filing of a bond to guarantee the payment of prizes; that the race be run under the jurisdiction of Professor Hutton and further takes up the right of sanction, the qualification of racing cars and numerous other details. If Vanderbilt's suggestion is carried out it seems likely that the Grand Prize will be removed from the jurisdiction of the American Automobile Association.

Richard Kennerdell, chairman of the A. A. A. has been in constant conference with the race management and says both contests will be run as originally arranged. It is suggested that if the Grand Prize trophy is held up that the matter be threshed out after the contest. Both races carry championship awards, 900 points being allowed on the Vanderbilt and 800 on the Grand Prize, although the latter being open to 450-cubic inch cars, only those in the 300-inch class in their order of finish, will win championship points.

Vanderbilt specifies that 2 days must elapse between races, but Kennerdell is just as insistent that the Vanderbilt can run Thursday and the Grand Prize Saturday and says he will permit nothing to interfere. There is a prize award of $7,500 for each race and championship points toward the $13,500 cash and trophy award of Goodrich and Bosch.

Entries close Saturday with twenty-four cars scheduled to start in the Vanderbilt and twenty-six in the Grand Prize. The cars and drivers for the Vanderbilt follow:

Car.	Driver.
Delage	Oldfield
Mercer	Ruckstell
Mercer	Pullen
Mercer	Thomas
Hudson	Roads
Stutz	Cooper
Unnamed	Durant
Hartman	Lentz
Hercules	Agraz
Duesenberg	Moosie
Chowchilla	Golden
Gandy	Price
Duesenberg	Weightman
Duesenberg	Rickenbacher
Gandy	Palmer
Peugeot	Resta
Peugeot	Aiken
Omar	Toft
Duesenberg	Buzane
Hudson	Vail
Hudson	Paterson
Owl Special	Marshall
Cody Special	Cody
Marmon	Jackson

The entries for the Grand Prize are the same, with the additions of Wilcox in a Peugeot and Anderson in a KisselKar. The Vanderbilt will be for thirty-five laps of the 8.401-mile course, or 294 miles, and the Grand Prize, forty-eight laps, or 403 miles. Some practice laps have been turned at 90 miles per hour, which may be taken as indication that the course record of 78.72 miles per hour, held by Tetzlaff, may be broken. Horstman's mechanic, Charles Schwartz, is in the hospital with a bare chance of living, having been injured when their Mercer turned over in practice. There is a possible chance that Oldfield will not start. Earl Cooper has been trying out two cars, one of which caught fire in Saturday's practice, but may be repaired in time so that he will have a car ready for each race.

Michigan avenue, Chicago, had a number of temporary movie houses on election night. Regulation coops were supported by motor trucks and results flashed to screens across the avenue. A photograph of Hughes is being shown

PAIGE WINS PHOENIX RACE

Phoenix, Ariz., Nov. 13—Special telegram—E. L. Cord, driving a Paige, won the Douglas-Phoenix road race today, covering the 273 miles of the Borderland highway in 8 hours and 30 minutes. P. Thomason, in a Buick, was second.

Sixteen cars competed. The race was open to cars and drivers from Arizona, New Mexico and Texas, with the condition that both driver and entrant must have been a resident of one of the three states for the 6 months prior to the race.

An entry fee of $25 was charged for each car, and this money was added to $1,750 prize money and was divided between the entrants making the best time from Douglas to Phoenix, 60 per cent to first winner; 25 per cent to second and 15 per cent to third. Drivers were confined to the course along the Borderland highway as designated, and any deviation therefrom automatically disqualified the entrant. All entries started by two and five finished before the checking station closed.

A CORRECTION

In the October 26 issue of Motor Age in the article describing the Philbrin ignition system made by the Philips-Brinton Co., Kennett Square, Pa., single-spark system and high-frequency system were called main and secondary systems, respectively. The manufacturers state that the S on the switch applies to the high frequency system and the M on the switch refers to the single-spark system.

CHICAGO AMATEUR RACES

Chicago, Nov. 10—It seems possible that next year will see a series of amateur races run on the Chicago speedway quite similar to those that were fortnightly events on the Brooklands track prior to the war. These races probably will be run under the auspices of the Mid-West Motor Club that was formed this week by a number of those who took part in the amateur races held here this year nad present plans include competition among all cars up to and including 230 cubic inches piston displacement.

Ray Harroun in a letter to President Reid, of the Chicago speedway, takes exception to making these races 230 cubic inch events, or allowing cars with displacement. Harroun intimates that 185 cubic

inches would be the logical high limit, giving as a reason that makers of cars up to 230 cubic inches displacement would occasionally enter a special car and thus work a hardship against those manufacturers of smaller cars who, he feels, would make a serious effort to produce cars suitable for racing in the class limited to 185 cubic inches.

A canvass of the American motor car field fails to show the wisdom of making the limit 185 cubic inches, for it it doubtful if the mere handful of cars that would then be allowed to enter a competition of this kind would create sufficient interest to attract the general public. For example, there are approximately seventeen makes of cars with a displacement of 185 cubic inches or under and among those more than half are cars that are seldom heard of and less often seen, while if the limit were placed at 230 cubic inches, at lease forty additional makes of cars will be allowed to compete and among these forty are the cars of which one sees the most of on the street—in other words these forty may be looked upon as the most popular medium-priced cars on the market.

BRISCOE AGAIN BREAKS RECORD

Oakland, Cal., Nov. 10—In a dash from Oakland to the summit of Mount Diablo, a distance of 33 miles, to an elevation of 3,869 feet above sea level, in 55 minutes flat, a four-cylinder Briscoe touring car, driven by Ben Hammond, has again brought the championship title for this gruelling course back to the Briscoe camp. Hammond and his mount raced from Oakland to the summit of the mountain last Sunday and chopped 4 minutes off the previous record.

Sunday's dash marked the second time that Hammond has broken the record, and incidentally the Briscoe camp again is in possession of the two trophies that go with the shattering of the speed mark.

MAXWELL MAKES SPEEDY RUN

Detroit, Mich., Nov. 11 — A Maxwell stock car, driven by Ray McNamara, completed a speed test from Detroit to Kalamazoo and return in 9 hours and 45 minutes, covering a total distance of 350 miles, with an average speed of 36 miles an hour.

The test was held, preliminary to the engagement of a Maxwell stock car in a contest which may arise as a result of the Maxwell challenge issued recently to all motor cars selling for $1,000 or less. The route taken included the towns of Lansing, Grand Rapids, Kalamazoo, Battle Creek, and Jackson, and the run was officially observed and checked by Detroit newspaper men. More than 50 per cent of the run was made over roads that were in the worst possible condition for touring and in several places the car was forced to make long detours because of construction work. The start was made from Detroit at 3:15 a. m. and the car was checked into Detroit at 1 p. m.

Winnipeg to Galveston in 73½ Hours

Relay Run from Dominion City to Sunny South Betters Train Time

GALVESTON, Tex., Nov. 10—Beating train time by hours, motor cars, running in relays, with transfers at county lines, delivered a letter to the mayor of Galveston at 12:32 p. m. last Saturday. The letter was sent from Chester, Neb. At the same time it was delivered to the first motorist of the run a copy was placed in the mails. The mail copy had not reached Galveston. The letter delivery stunt was a part of the Meridian road run over the Winnipeg-to-the-Gulf highway.

The speed on the last 93-mile leg of the trip was the greatest average made on the entire trip from Winnipeg. The Winnipeg-to-the-Gulf run left the Canadian city Wednesday, November 1, at 11 o'clock. The Galveston end was completed in 73 hours, 32 minutes. There were three objectives — Galveston, Corpus Christi and Laredo. The Laredo driver left San Antonio Saturday at 10 o'clock, 10 hours ahead of schedule, and was due at Laredo at 2:30 p. m. The Galveston run was made 22 hours and 28 minutes ahead of schedule. The run was arranged by W. W. Watson, Chester, Neb., president of the Winnipeg-to-the-Gulf highway.

ASKS CHAUFFEURS FOR SUGGESTIONS

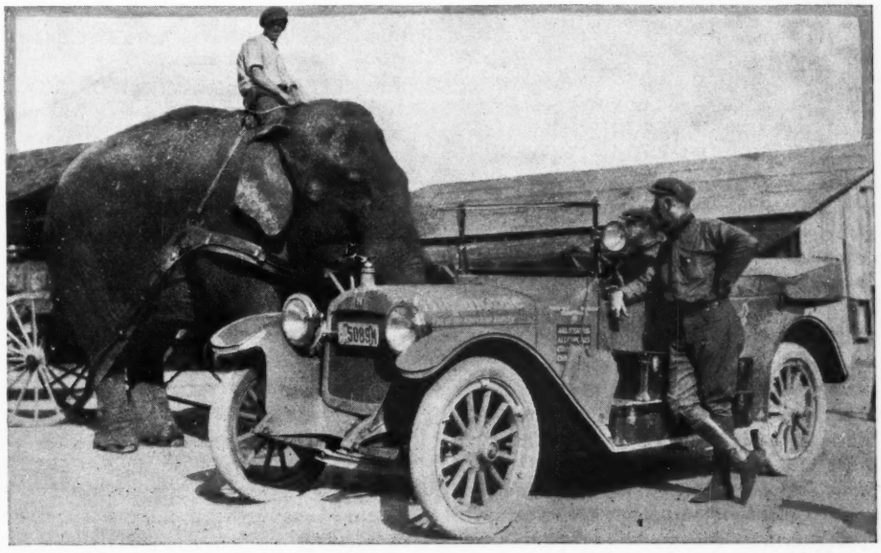
Springfield, Ill., Nov. 13—Lewis G. Stevenson, secretary of state, has called on all chauffeurs to suggest any changes in the motor car law, which they think would be advisable to promote the welfare of drivers and car owners and the safety of the public. Stevenson is anxious to prevent the employment of unlicensed chauffeurs. With every license sent out there is a letter to car owners, warning them a fine of $25 is invited for every instance where a chauffeur is employed, who is not provided with a license. Despite this hundreds of chauffeurs are being employed who have failed to take the necessary examination and procure a permit. Mr. Stevenson says traffic conditions are rapidly changing with the ever-increasing number of cars and often one can call to mind situations where the law fails to apply or does not meet the demand. The records show that the man on the job is the best qualified to give suggestions for the improvement of the business he follows, and, for this reason Mr. Stevenson hopes to receive many useful suggestions.

OLYMPIAN GETS FLANDERS PLANT

Pontiac, Mich., Nov. 10—The general offices of the Olympian Motors Co. have been moved into the main office building formerly occupied by the old Flanders Mfg. Co. These are of fire-proof construction, of structural steel and brick with large windows, electric hoist elevators and all modern conveniences and were constructed especially for car manufacturing.

HUPP PARTY SNOW-BOUND

Detroit, Mich., Nov. 13—The Hupp capital-to-capital car leaving Salt Lake City Thursday, November 9, arrived at Hanna, Wyo., yesterday. The party attempted to leave Hanna, which is at the Continental Divide, and 6,500 feet above sea level, to travel to Medicine Bow, but was forced to return owing to heavy snow storms. From present conditions it appears that the car will be unable to proceed for several days.



Elephantine welcome accorded Hupmobile capital-to-capital car at Universal City, Cal., the film capital of America

N. A. C. C. Protests Scare Advertising

General Concensus of Members Is That Value of Such Copy Is Negative

NEW YORK,Nov. 13—With the object of eliminating what it terms "scare" advertising, eighty members of the National Automobile Chamber of Commerce at its last meeting recorded themselves as being opposed to advertising which can be classed under this head. This opposition is directed not only against concerns connected with the motor car industry, but against advertising in general, which can be characterized under the scare heading.

Exactly what is meant by scare advertising might be made clear from the following extract bearing on the subject: "We may expect to see pictures of people dying in restaurants because they ate the wrong brand of bacon; of people mangled at the bottom of elevator shafts because they rode in an elevator using the wrong safety device; of children being rescued from fires because the wrong kind of window panes were used in the building; of passengers being carried under the ocean waves because they traveled on the wrong steamship line; etc., etc."

The N. A. C. C. has at present a committee working for a betterment of advertising along this line. This committee is expected to accomplish as much as possible by co-operation not only with vehicle makers, but also with those manufacturing parts and accessories. The question of scare advertising already has been taken up with certain companies and it is expected that there will be an elimination of such as the result of this work.

The reason for the N. A. C. C. taking up this matter is that members of the chamber hold the view that scare copy is negative rather than affirmative in its effect, and that some more positive and constructive form of advertising could be used.

HIGH MUD COST IS PROVED

New York, Nov. 10—Increases of land value ranging from 25 to 194 per cent, and reduction of hauling costs from 33.5 cents per ton-mile to 15.7 cents, due directly to road improvement in eight counties, prove conclusively that dirt is not cheap when that dirt is on the highways

These and a number of other interesting and important facts are presented in a bulletin of about 150 pages just issued by the Department of Agriculture under the title "Economic Surveys of County Highway Improvement." The work is an analysis of results obtained from road improvement in four counties in Virginia and one each in New York, Alabama, Florida and Mississippi, during a period of 5 years.

Following improvement of the main market roads, the selling price of tillable lands served by the roads increased from one to three times the total cost of the improvements. The gross annual saving in hauling costs due to the good roads amounts to $627,409 for a traffic of about 3,500,000 ton-miles, while the net saving, after deducting the cost of interest and principal for road work, averages 11.6 cents per ton-mile for hauling.

EMPIRE TIRE REORGANIZING

New York, Nov. 14—Special telegram—The Empire Rubber and Tire Co., Trenton, N. J., has about completed negotiations for reorganizing and refinancing to take care of increased business and expense. The underwriting of the new stock is in the hands of New York bankers.

REGAL PLANT NOT SOLD

Detroit, Mich., Nov. 13—Published reports of the purchase by the Fisher Body Corp. of the factory from the Regal Motor Car Co. has led many to believe that the entire Regal plant was taken over by the Fisher concern. This is not correct. The Regal plant was scattered over a great deal of ground and in order to increase efficiency and better production, arrangements were made by which the production of Regal cars was concentrated some time ago and one of the buildings was released. This building has for some time been leased to the Fisher Body Co. and this one alone recently sold to that concern.

The Regal plant, as it stands today, covers 9 acres of floor space and the production this year will be between 7,500 and 10,000 cars, according to President Haines.

TO CONSIDER PARK MOTORING

Washington, D. C., Nov. 8—For the purpose of increasing motor travel in the various national parks in 1917, Stephen T. Mather, asistant to the secretary in the Department of the Interior, is arranging for a general conference on this subject and other matters relating to the national parks to be held in this city the first week in January. The conference will probably extend over a week or 10 days, 1 day of which will be devoted exclusively to the question of motor travel in the national parks.

LACIAR KENT SALES MANAGER

New York, Nov. 13—R. J. Laciar has been appointed general sales manager of the recently formed Kent Motors Corp. The company, which will build a plant in Bellville, N. J., has a capital consisting of 200,000 shares of the par value of $10 each. Sixty percent, or 120,000 shares, is held in the treasury. Against this will be issued negotiable trust certificates exchangeable in 3 years for stock. The Security Transfer and Registrar Co., 66 Broadway, this city, has been designated as the depositary and transfer agent of the company. The stock has been underwritten and is to be listed, it is stated, on the New York curb.

MONARCH TO MARYLAND

Hyattsville, Md., Nov. 13—Monarch cars will be manufactured in this city as soon as all the machinery and materials arrive here. The Carter Brothers Co., this city, has secured the exclusive rights of the Monarch Motor Car Co., Detroit, and will build both Monarch models, an eight and a twelve. In addition to the above standard models a new design of light car will be added to be known as the Monarch Midget. The business of the Monarch company will be continued under the Monarch Motor Car Co., a subsidiary organization of the Carter Bros. Co.

NO KING ST. LOUIS BRANCH

Reports of the appointment of new branch manager for the King company at St. Louis has been labeled incorrect by the King Motor Car Co., Detroit, Mich., as there is no factory branch in St. Louis.

STERLING GOES TO BRIDGEPORT

New York, Nov. 13—Headquarters of the Sterling Automobile Mfg. Co. have been moved to Bridgeport, Conn., Charles M. Ames becoming president. Sterling cars will be built in a factory at Amston, Conn., in one chassis with roadster, five-passenger touring and ½-ton delivery bodies. Several changes in design are contemplated.

ARMSTRONG AND CUTTING INJURED

Detroit, Mich., Nov. 12—J. H. Armstrong and Charles D. Cutting, of the Cutting, Armstrong & Smith Sales Co., were injured November 10 when a car in which they were riding overturned near Trenton, Mich., pinning them underneath. Mr. Cutting suffered a broken left leg. Mr. Armstrong escaped with minor bruises.

The accident happened when Mr. Cutting, who was driving, turned into the ditch to avoid hitting another machine. The driver of the other car increased his speed after the accident, and was soon out of sight. A passing motorist rescued the men by cutting away the car top.

Gasoline Specifications Outlined

Bureau of Mines Offers Tentative List of Requirements for Consideration

WASHINGTON, D. C., Nov. 10—Tentative specifications to govern the purchase of gasoline by the executive departments of the Government in Washington have just been made public by the Bureau of Mines under the direction of Van H. Manning. The specifications are simple in principle and are almost axiomatic. The only problem left by them is to fix the limits which shall satisfy their requirements. The fallacy of classifying gasoline according to the specific gravity was pointed out in the investigations and the importance of volatility was emphasized.

The Bureau of Mines outlines its specifications thus:

1—Neither the gasoline nor its products of combustion should have a strong or markedly disagreeable odor, this being objectionable to users of motor cars.

2—The gasoline should be free from matter which is not hydrocarbon, such as water, sediment, acid and so on.

3—The gasoline should be free from bodies which either originally or after combustion attack the metal composing the engine. Acid unremoved in refining and excessive sulphur content fall under this head.

4—The gasoline should not contain excessive percentages of unsaturated or aromatic hydrocarbons, since some evidence is at hand to indicate that there may be limits in the ability of motors as at present constructed and adjusted, to utilize these products.

5—The gasoline should not contain too high a percentage of very volatile products which tend toward high evaporation losses and excessive danger in handling and storage.

6—The gasoline should not contain any considerable percentages of heavy or nonvolatile constituents which prevent the atomization into engine cylinders of a mixture which can be burned completely.

General Criticism Asked

The specifications were in response to the request of the General Supply Committee of the executive departments. Copies have been sent to refiners, motor car engineers, jobbers and other men prominent in the industry, with the request that the draft be criticised so that when the specifications are made final they will be fair alike to the refiner and consumer. Whether or not this ideal state of pleasing both refiner and consumer can be attained remains to the future to show. Meanwhile, it is hoped that these tentative specifications as herein outlined and explained will result in a consensus such that the final specifications will be of value not only to the Government in its purchase of gasoline in the District of Columbia, but to all who use gasoline for fuel purposes.

The specific gravity test has been eliminated in the tentative specifications. It is generally considered that specific gravity alone means little, since it may give a high rating to a poor gasoline and a low rating to a good one. At present, the general tendency is to either specify tests which are unreliable or else make requirements which are unreasonably severe. Many buyers believe that only straight refinery gasoline, and not casing head gasoline and cracked products, are desirable, and the test they require discriminates against a large portion of the market supply of gasoline.

Volatility Is Basic Test

The basic property which determines the grade and usefulness of a gasoline is volatility. It is not, however, a property whose influence may be stated concisely and in a few words. It is, of course, advantageous to have motor fuel vaporize easily, and it is obvious that gasoline is not gasoline if it cannot be converted into an explosive gaseous mixture under conditions existing in the engine. These simple considerations would lead to the conclusion that the desirable product is one having a fairly high initial boiling point and a low end point. Here again, however, it is necessary to take account of further considerations which complicate the matter. The first is that a gasoline of narrow and selected boiling range is bound to be exceedingly expensive. In addition it is not an unmixed advantage to have such a product. A high initial boiling point tends to make the engine in which such a product is used difficult to start in cold weather. It is also a question as to whether or not the low end points is an unmixed advantage. Some of the refiners of so-called blended products claim that the presence of the heavier naphthas causes the explosion in the engine cylinder to take place more slowly than in the case of lighter gasoline. The piston head is drawn through the same distance and the same power is developed, but the force is applied with a gradual push rather than with explosive violence. It is claimed that this sort of action lessens the strain on the engine and actually tends toward greater power production.

These are claims for which as yet no conclusive experimental proof seems available. They seem plausible and are more than likely to receive credence, because such products are bound to be used on account of cheapness.

In summing up the desirability of various degrees of volatility, it appears that it is desirable to have a certain percentage of fairly low-boiling constituents so that engines may start readily, but undesirable that such constituents should be present in too large proportion, on account of the resulting increased possibility of loss through evaporation and of accidental ignition and explosion. A reasonably low end point is desirable to insure complete vaporization, but it makes the gasoline expensive. In addition, if it is possible to utilize high end point gasolines efficiently, it seems conceivably possible to develop maximum power with less strain on the engine. For these reasons, the end point should be as high as is possible without exceeding a limit set by the ability of the engine to atomize and vaporize the gasoline properly. It is impossible to set limits which will meet all needs, but figures which general use seems to indicate as most practical have been chosen.

The analytical methods used for the testing of gasoline are of fairly recent development, but no adequate description of them appears to be available. Some of the tests employed are not standardized, and there are substantial differences in the methods by which they are conducted in various laboratories. There seems also to be a lack of knowledge regarding the practical interpretation of results obtained by analysis. The tendency is to over-emphasize some particular figure. Formerly specific gravity was considered the complete index of the qualities of gasoline. At present a similar over emphasis is placed on the so-called "end point" of the Engler distillation. One of the chief objects of the proposed gasoline specifications is to indicate rationally methods of interpreting the analytical results.

Heavier Grades Are Cheaper

At the present time several grades of gasoline are sold, these generally being classified according to their specific gravity, though the distinctive quality is that of volatility. The gasolines with low specific gravity, and generally with low boiling range, sell for the highest prices. Heavier grades are cheaper, and, if properly used, they are capable of developing more power per unit volume than are the lighter gasolines.

The Bureau of Mines has considered it advisable to divide gasoline into three classes, according to the maximum temperature limit in degrees Centigrade below which 90 or 95 per cent by volume must distill. The high-grade gasoline is to be used for special purposes, such as for aeroplanes and so on, and should include products of the type now sold in the Eastern market as of 70 degrees Baumé or over. The middle grade is to be used for motor

cars of a design of, say, 2 years ago and is represented by the type of gasoline now sold in the Eastern market which ranges from 65 to 70 degrees Baumé. The third grade, represented by the gasolines now sold in the Eastern market as around 60 per cent Baumé gravity, is used satisfactorily in up-to-date motor car engines. It is realized that the motor car engine has been improved so that it can use a heavier grade of fuel than was possible a few years ago.

There are at present on the market types of gasolines produced by several general refining methods. These may be classified as follows:

1—"Straight" refinery gasoline.
2—Blended casinghead gasoline.
3—Cracked and blended gasoline.

"Straight" Refinery Gasolines

"Straight" refinery gasolines are produced by methods which vary somewhat in different parts of the country, but are in general similar. Crude oil is distilled in a fire still and a cut made when the gravity of the product reaches some predetermined mark. The so-called crude naphtha or benzine is acid refined and then steam-distilled. In some cases several products of different ranges of volatility are produced; in others the steam distillation simply effects a separation from less volatile bottoms which go into the burning oil stock.

"Straight" refinery gasolines are characterized by low content of unsaturated and aromatic hydrocarbons and by a distillation range which is free from marked irregularities.

Blended Casinghead Gasolines

Casinghead gasoline is a product which has come on the market during the last few years and is produced from "wet" natural gas by processes of compression or absorption. "Straight" casinghead gasoline is too volatile for general use and before being put on the market is blended with a sufficient proportion of heavy naphtha to produce a mixture which is both safe for use and moderately cheap. Blended casinghead gasolines are generally characterized by a volatility range showing considerable percentages of constituents boiling at both low and high temperature but a deficiency of intermediate products. In some cases, however, the blending is done in such a manner that it is difficult to detect the natural-gas gasoline. This is when it is used in moderately small proportion to lighten and to make more volatile gasoline which has a boiling range approximately the same as that satisfactory for motor purposes.

As far as chemical properties are concerned, casinghead gasoline seems to be identical with the "straight" refinery product. The characteristic properties are, therefore, wholly due to the details of blending.

Cracked or Synthetic Gasoline

One of the important factors in the present gasoline market is the production of cracked or synthetic gasolines. These are being marketed in enormous quantities, largely, if not altogether, in the form of blends with "straight" refinery and casinghead gasoline.

Cracked gasolines are similar in physical properties to "straight" refinery products, but are different chemically in that they contain varying percentages of unsaturated and aromatic constituents. It has been demonstrated that these constituents do not decrease the value of a gasoline if they are not present in too great proportion. It is still an open question whether motor fuel containing very high percentages of unsaturated compounds can be utilized in the same way as the "straight" refinery products.

Attention is also called to the fact that refiners are today marketing gasoline containing considerable percentages of unsaturated compound, and these products are being satisfactorily used by the public.

Toledo Makers Expand

Capacity Business and Good Financial Outlook Bring Great Prosperity

Lack of Skilled Workmen and Insufficient Space Cited

TOLEDO motor car and parts makers are rushed to capacity. Each company is building or planning to care for increased demand. The chief difficulties of the plants are lack of skilled workmen and insufficient space. Everywhere the companies tell of remarkable prosperity and an extremely good financial outlook.

At the Milburn Wagon Works 900 men are employed, as compared to 600 men at this time in 1915. The company is making 1,500 cars this year as against 1,000 last year. It has purchased the plant of the Toledo Bending Co. and converted it into plant No. 2 of the Milburn factories, adding 128,732 square feet to the 514,931 square feet already occupied by it. It is planned to use plant No. 1 for the manufacture of closed cars and bodies, and plant No. 2 for making custom-made bodies and to care for light delivery business.

The concern has recently developed the electric taxicab business and plans to engage in that particular branch of the industry with special effort. Body work has increased 100 per cent and from present indications will grow an additional 100 per cent during the coming year.

The Electric Auto-Lite Co. has enjoyed a marvelous expansion. The company employs 2,200 people and occupies 422,000 square feet of floor space, and has four buildings in the plant, including a new one recently finished and utilized. One structure is used for heavy machine work and assembly, a second for stock rooms, receiving and shipping, mail order and repair work, and on one floor it has 500 girls engaged in winding field coils and armatures. A third building is occupied as a factory for making lamps, horns and starting switches and the fourth serves as the office, drafting and experimental structure. The new building is four stories high and constructed entirely of steel, glass and brick.

The concern did $6,000,000 in business last year and to date has shipped $10,000,000 for 1916, manufacturing 1,400 starters a day now, as compared with 800 in the year preceding. Numerous mechanical improvements have been installed to increase production, and these include electric ovens, cable conveyors, twenty automatic machines, automatic punch presses, milling machines and eighty Potter & Johnson machines.

Has 100 Per Cent Increase

The Ohio Electric Vehicle Co. found that October was one of the most successful months in its history. Business for the year has increased more than 100 per cent. The concern has manufactured 650 cars to date in 1916 as compared with 300 cars in 1915, and has doubled the number of salesmen on the road, doubled its national advertising and increased the number of men employed by 40 per cent. At present the company employs 250 men, but would take on 300 more if it could find the skilled aluminum workers required. The company anticipates an increase of 1,000 per cent in business for the coming year.

CANADA USES MORE GAS

Kingston, Ont., Nov. 10—The consumption of American gasoline in Canada this year has been greater than ever before. To date the amount used is 25 to 30 per cent larger than last year. In the average year the consumption in Canada is about 60,000,000 gallons. With an increase of 25 per cent, the consumption this year will be about 75,000,000 gallons. Throughout the period of high prices gasoline has been cheaper in Ontario than elsewhere.

For the purposes of comparison with Canadian prices the imperial gallon must be used as a basis. This is one-fifth larger than the wine gallon and would bring the American price to 27.6 per gallon. To this must be added the duty of 2.5 cents per gallon and freight to the amount of 1.25 cents per gallon. This would bring the cost of Canadian gasoline to 31.35 cents per gallon from tank to garages. The war tax of 7½ per cent is also levied. There are indications that present war prices will go down as a result of poor weather and the increased production of crude oil.

Government registration returns indicate that there are approximately 120,000 cars owned in Canada today—an increase in round figures of 45 per cent since a year ago. Ontario, with approximately 50,000 cars, maintains her position as the banner motor province of the Dominion, as in Ontario are more than three times the number of cars in any other province, and approximately 42 per cent of all the cars in the Dominion.

Winter Modes for Men Who Motor

Every man cannot be a racer, but every man might conceivably want a racing cap at some time or other in his life. This cap comes in gray and tan and is of gaberdine cloth. Auto Supply Co., New York City—$3.50

An overcoat is not only a necessity, but it may be a joy forever. How about this special model to the extreme left, the back of which is shown in a smaller oval? It is made of gaberdine material and has the new form-fitting lines of the season. The Hub, Chicago—$25

Below at the right is shown the loose-fitting model which is to keep its favor, form-fitting or no, we are told. It comes in shaggy mixtures and has pockets large enough to carry many things. A back view appears above. The coat is made of gaberdine material and is offered at various prices. Mandel Bros., Chicago—$19.50 to $30

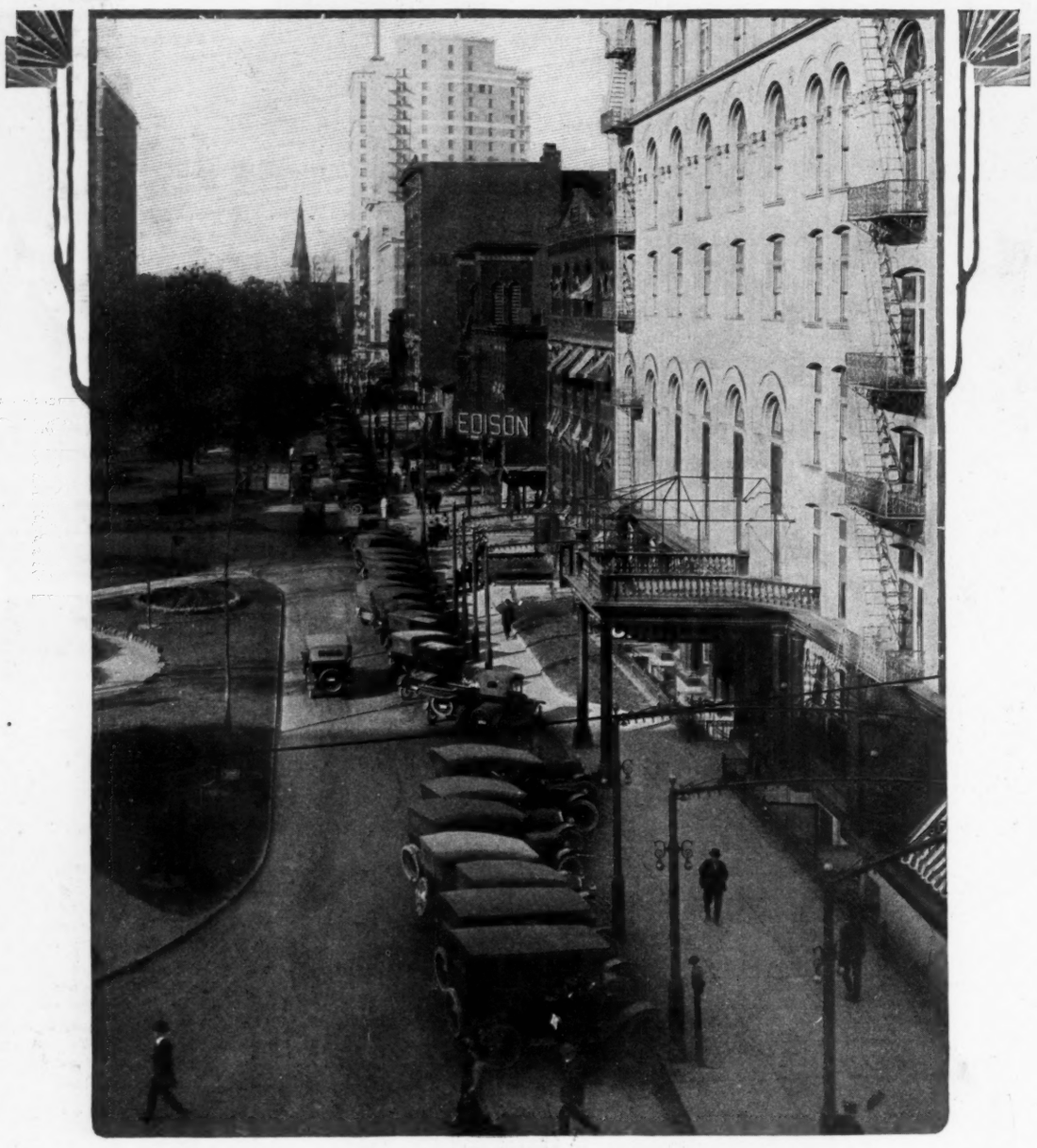
A horsehide palm and strapped wrist make this pair of gauntlet gloves distinctive and bring added strength of grip and warmth of hand to the man at the wheel during cold drives. Auto Supply Co., New York City—$4

Left—Sometimes a warm vest goes a long way to make motoring in the fall a pleasure. This one is of Angora wool and should be warm enough for any man. It comes in several colors; brown, gray and green are three. Auto Supply Co., New York City—$6.50 to $8.50

Right—If you would go further and have a sleeved coat of knitted goods underneath your overcoat, here is one that comes in gray and blue heather. Auto Supply Co., New York City—$6

How Detroit Does It

Parking Regulation in the City of Motor Cars as Shown by Photographs of Downtown Streets



Washington boulevard shows row after row of closely parked cars. This is looking northward at Michigan avenue. Drivers often are forced to park several squares away from the desired location, because space is limited. This scene is typical of any time of the day. The boulevard, by the way, is about half a block wide

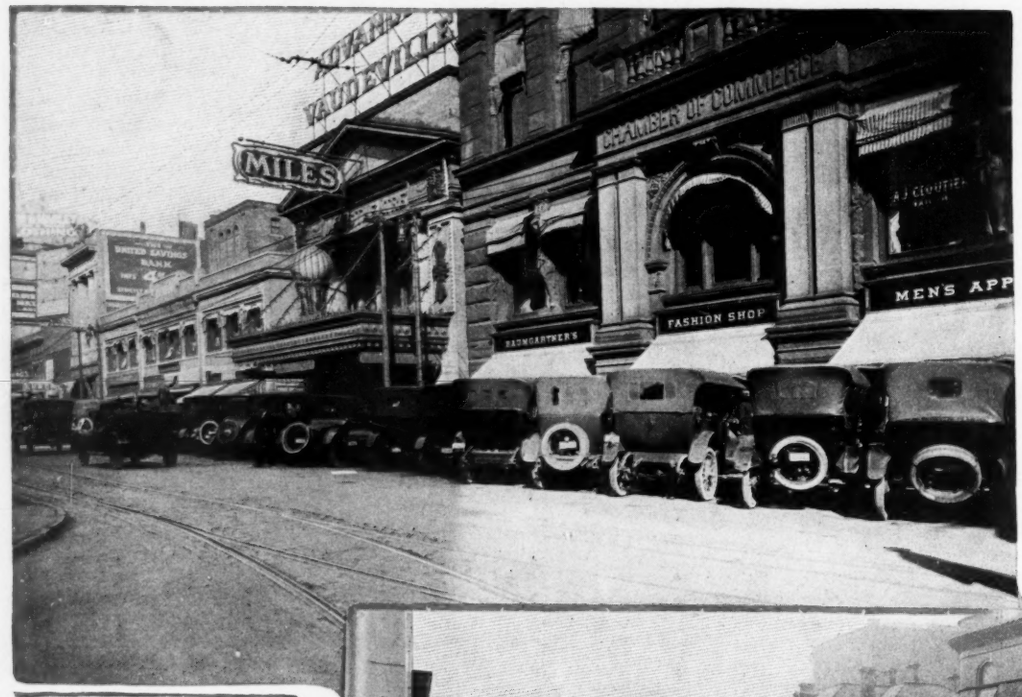
DETROIT is noted for its parking system, the practice of which the photographs on these few pages show, but the parking system is not more worthy of notice than the streets to which the system is applied. The original plan for this, the city of motor cars—on a small scale, it is true—was a series of concentric semicircles with the Grand Circus, a semicircular park of about 5½ acres as a center, nearly a mile from the river, toward which the circles extended.

This plan is still noticeable, but the new growth has been laid out in checkerboard pattern, relieved only by boulevards 100 to 200 feet wide radiating from this common center. Jefferson avenue parallels the river. Woodward avenue runs at right angles to it, dividing the city into halves and the Grand Circus into quadrants. South of Woodward are Michigan and Grand River avenues at different angles and north of it is Gratiot. Between the Grand Circus and the river is the Campus Martius, an open space about 600 by 200 feet, crossed by Woodward and Michigan, from which run Monroe avenue and Fort street.

The streets are wide—50 to 100 feet—well shaded and notably clean. The chief business street is Woodward. Jefferson avenue is another leading one. Griswold, with its banking houses, custom house, office buildings, etc., is the Wall street of Detroit. The chief show street is the Grand boulevard, a macadamized parkway 150 feet wide and more than 10 miles long, encircling the heart of the city in a vast sweep from Belle Isle bridge at the east to Fort street at the west.

Above is Cadillac square, looking westward from the courthouse. The space in the center is a parking ground where cars may stand through the day. It is used also by taxi companies. Note the machines at the curbs. On one side they are parked at an angle; on the other some are at an angle and many in parallel position, while the side street shows all stand parallel with the curb

Fort street at Griswold gives all kinds of trouble with its many corners. White lines on the pavement denote foot and motor car routes. Along some of the curbs the cars are parked in parallel positions; other curbs call for parking at an angle, in some instances, almost a right angle



This photograph was taken at Griswold and State and shows the congestion that exists even when the cars are parked at an angle. Many a car driver leaves his car at a distance if he is bound for a building here

At Fort street, looking westward from Wayne. Both sides of the street are filled, and practically every available location is utilized, both on Fort and on the adjoining side streets

Woodward avenue is the main business street and also the main artery for traffic in Detroit. The narrow space between parked cars and street cars make motor car traffic a slow and careful operation

This map shows the downtown district of Detroit. Cadillac square and Bagley avenue have no parking time limits, except along the curb, where the 1-hour limit applies. These are public parking places, provided for those who have to leave their cars in one place longer than an hour.

No parking is allowed within 75 feet of an intersection on the side the car stops on. This, of course, applies only to streets with car lines. Safety zones along the curb and cross-walks also are kept free of parked cars, while a 1-hour limit restricts all curb parking in the congested business districts

On the wide streets parking is at an angle of about 45 degrees, and one foot of space between cars is allowed. One front tire may be against the curb. On the narrow streets parking is parallel with the curb, cars are 5 feet apart, and the right wheels are not more than 4 inches from the curb

No parking is allowed within 15 feet of a fire hydrant or on narrow streets having street car lines

Many Cities Revamping Ordinances

Working Along Lines Suggested by the Eno System

WITH the exception of certain phases that are admittedly local problems, Motor Age finds that quite a number of cities have traffic regulations that harmonize with the Eno plan of handling traffic. L. M. King, secretary of the San Francisco Chamber of Commerce, writes that the provisions of the ordinance governing the Golden Gate city closely correspond with those outlined in Motor Age. The same is true of Dayton, O., according to J. N. Allaback, chief of police. August Vollmer, chief of police of Berkeley, Cal., who is a member of the committee appointed for the purpose of studying and putting the traffic situation before the International Association of Chiefs of Police says: "All the recommendations in the Eno ordinance are contained in our city ordinance."

We might cite numerous other examples of ordinances in various cities that are patterned after the Eno system at present. However, there are many more cities that promise action towards standardization and the Eno system is now under contemplation by safety bureaus, city councils and others having traffic matters in hand, among these being the Rotary Club, Dubuque, Ia., Department of Police, Peoria, Ill.; Committee on Public Safety of the Association of Commerce, Grand Rapids, Mich.; the city council of Winona, Minn.; traffic department of the Erie Board of Commerce, Erie, Pa.; Chamber of Commerce, Webster, Mass.; Board of Streets, Wilmington, Del.; Commercial Club and Superintendent of Streets, Omaha, Neb.; the Municipal Councilors, Oklahoma City, Okla.; Police Department and Board of Trade, Quincy, Mass.; Chamber of Commerce, Colorado Springs, Colo.; Automobile Club, Colorado Springs, Colo.; Chamber of Commerce, South Bethlehem, Pa.; traffic committee of the Chamber of Commerce, Ossining, N. Y.; city traffic committee, Kansas City, Mo.; Chamber of Commerce, Oakland, Cal.; Board of Trade, Northampton, Mass.; City of Grand Forks, N. D.; Chamber of Commerce, Quincy, Ill.; commissioners of Pueblo, Colo., and the Tacoma Automobile Club, Tacoma, Wash.

"I do not see how our city could do better than adopt the Eno system," says Fred J. Johnston, chairman of the central safety committee, San Antonio, Tex. "I am particularly struck with the suggestion made by Motor Age on parking. I have noticed that very few cities require their vehicles to be parked other than at right angles to the curb. I have always been of the opinion that if vehicles would park at an angle of from 30 to 40 degrees, very little, if any, space would be lost and certainly the vehicle could be backed out with less danger of delaying traffic. I shall endeavor to get your ordinance passed here."

Too Many Hand Signals

BINGHAMPTON, TENN., Editor Motor Age—Standardizing traffic rules is a move which should have the support of every motorist, but I would sound a warning against the danger of a multiplicity of signals.

If the driver of a motor car is over-burdened with signals he sooner or later will disregard some, if not all of them.

It is not unusual to see a car about to make a turn with the driver holding out a hand on one side, and another occupant holding out a hand on the opposite side, making it impossible to tell whether the car is going to turn to the right or to the left.

After giving the matter a little thought it readily becomes apparent that the only signal necessary by the driver is the one indicating that a turn is about to be made to the left, as explained in the article in your issue of October 12 under the heading, "Wants Fewer Hand Signals."

I can see no excuse for a man bumping into the car ahead if he exercises even ordinary judgment. If the car ahead is slowing or stopping, the driver following should observe the space between the cars and be governed accordingly. The man who would not notice this, would not see a stop signal.—E. Buelow.

Contemplates Big Automotive Plan

Will Deal in Anything Run by Motor—Scope Is Broad

BOSTON, Mass., Nov. 11—With a charter that is more broad than any ever granted to a motor corporation in New England, if not in the United States, Harry Fosdick, Inc., was put through here today. While its primary object is to deal in Pathfinder cars for New England, its main object is to go into everything possible along the line of automotive power. Fosdick has been working on the plans for the last 6 months. The charter grants the right to sell, manufacture, buy and deal in all automotive powers, including motor cars, aeroplanes, marine, railroad or anything else that moves with a motor. No other motor car man is identified with the company, which has a capital of $20,000, and has leased temporary salesrooms at the Fiat branch.

Mr. Fosdick's idea is to begin operations to meet the future which he realizes will mean the adoption of motors more generally for aeroplanes, submarines, vessels of all kinds, and even for railroads. William Hilliard, who was formerly with him, and who spent much time with the Burgess Aeroplane Co., learning to handle aircraft, has joined him. Hilliard was with the Pathfinder also, and is remembered for winning the Climb to the Clouds, and the light car race at Savannah with a Lancia.

DODGE VS. FORD POSTPONED

Detroit, Mich., Nov. 12—A continuance of 1 week, by consent of opposing counsel, was granted in the injunction proceedings started by the Dodge brothers to restrain Henry Ford from extending the Ford plant and to compel a further distribution of profits to Ford stockholders.

"The preliminary taking of evidence will not be finished in the coming week," said Attorney E. G. Stevenson for Dodge Bros., "but we expect it will have reached a point where we can come into court and agree upon the fixing of a certain day for the commencement of the trial."

The plaintiffs state that they expect to present evidence to show that the expansion planned by the Ford head jeopardizes the monetary interests of the minority stockholders.

NEW GAS MEASURING DEVICE

Springfield, Ill., Nov. 13—H. E. Maurer, has been granted a patent on a gasoline measuring apparatus for service stations. A new feature lies in the fact that the purchaser sees the gasoline that he is securing and knows that the measure is correct. The fluid is not forced into the tank of the car by a turn of the crank pump, but by means of compressed air.

The gas is released simply by opening a valve and letting the air into a jar above the gas tank. While one jar empties, another fills and the flow is automatic and constant. It is asserted that the operation of a crank in raising gasoline is often inaccurate. By using 5-gallon jars, which have been tested by an inspector, the consumer is able to see that he receives every drop to which he is entitled.

TWO NEW BRISCOE PLANTS

San Francisco, Cal., Nov. 11—The Briscoe Motor Corp., Detroit, Mich., has completed plans to build an assembling plant in this city and Kansas City, Mo. The local plant will be capable of turning out from 10,000 to 20,000 cars a season. The Kansas City plant will cost $300,000.

REFINANCING PERMITS CONTINUANCE

Albany, N. Y., Nov. 10—The International Motor Truck Corp., as a result of the recent refinancing, has been formed and will carry on business with $7,372,790. The capital consists of 71,043 shares of $100 each and 53,638 shares of no par value. The directors are A. E. Moore, G. F. Jebbitt, T. S. Buckingham.

COLE HAS SERVICE CONFERENCE

Indianapolis, Ind., Nov. 10—More than 100 service men employed by the various important distributors of and dealers in Cole cars have been assembled in Indianapolis by the Cole Motor Car Co., for their first service men's conference. The purpose of the meeting is to outline a new service program which has been adopted.

FAKE SOLICITOR CAUGHT

Detroit, Mich., Nov. 10—In its November 2 issue Motor Age called attention to a subscription swindler who was cashing in on its popularity through the means of fake receipts, premiums and cut rates. This week a man signing himself S. E. Summers, and who is apparently the same individual who has used the aliases of C. A. Chase, Frank Graham, A. B. Cutler, Frank G. Skeen, C. A. Harper, and others, was arrested by the Detroit police, prosecuted and sentenced to jail. Sixty people appeared to testify against him.

NEW TRUCK AT KENOSHA

Kenosha, Wis., Nov. 11—Another large motor truck factory will be established at once in Kenosha, Wis., it was announced today. Martin P. Winther, who has been prominent in the development of the Jeffery Quad, and for many years associated with the Thomas B. Jeffery Co., Kenosha, has organized the Winther Motor Truck Co., with an authorized capital stock of $330,000, and is making final arrangements for the construction and equipment of a large factory here. A tract of 4 acres just west of Kenosha was purchased yesterday, and it is hoped that by the middle of April work on buildings will have progressed sufficiently to make production possible. Further details concerning the personnel of the Winther organization, the extent of its shops, and the product, are not available, but will be made public in due time.

BIMEL SALES IN BIG GAIN

Portland, Ind., Nov. 10—The Bimel Spoke & Auto Wheel Co., manufacturer of all types and sizes of car and truck wheels, has just closed its fiscal year and the yearly statement shows sales increase of 22 per cent over last year. A new plant for the exclusive manufacture of truck wheels, eight new dry kilns, two new dry storage warehouses, a new department for preparing bending material, and a new truck wheel tiring department, have been erected, which brings the capacity up to 300 sets of car wheels and 100 sets of light truck wheels in a 10-hour day. The bending department has a capacity not only to take care of these wheels, but to furnish rims to a few manufacturers of high-grade cars who build their own wheels.

GOODYEAR GOAT TO PASTURE

Akron, O., Nov. 10—The far-famed and much-traveled Goodyear goat, which has been awarded monthly to the leading district of the Goodyear Tire & Rubber Co., in the matter of sales, has returned to Akron, O., after a 2-year period of wanderings, national in scope. After his strenuous seeing-America-first campaign the goat has settled down to quiet life on the estate of President Seiberling.

The goat's successor in the way of a district prize is a silver cup, known as the Goat cup. It will become the property of the district winning it five times. The cup stands about 20 inches high and is a splendid specimen of the silversmith's art. On it is engraved a likeness of the goat and a brief history of his career as a Goodyear institution.

GOODYEAR COTTON MILLS FORMED

Hartford, Conn., Nov. 11 — The Goodyear Cotton Mills, Killingly, Conn., has been incorporated with $5,000,000 capital, to engage in general textile manufacturing. The incorporators are Francis Seiberling, Fred Miller and Harold Hutchins. This concern is practically a subsidiary of the Goodyear Tire and Rubber Co., Akron, O., and will manufacture tire fabrics for that concern.

FINANCES TRUCK SALES

New York, Nov. 10—A time-payment plan for truck sales has just been adopted by the Guaranty Securities Corp., which about a year ago entered the field to finance the sale of passenger cars by deal-

ers. The new plan is similar to the passenger car plan, which was described in Motor Age April 6, 1916, but the percentage of cash demanded is not so great because the truck is strictly a necessity and pays for itself.

The status of the Guaranty business may be surmised from its statement that since January 1 it has financed $18,000,000 of passenger car business. The truck plan has been in operation but a few days.

For a general understanding of the plan it may be stated that when the dealer sells a truck he collects 25 per cent cash from the customer and is paid nearly all by the Guaranty corporation, which collects from the truck buyer through notes. For handling and for adequate insurance a Guaranty charge is made and is paid by the truck buyer.

BELDEN OVERLAND ENGINEER

Toledo, O., Nov. 10—Edward H. Belden has been appointed chief engineer of the Willys-Overland Co. For the last 2 years Mr. Belden has been consulting engineer of the Packard Motor Car Co., Detroit, Mich. Mr. Belden began in business as mechanical engineer with the McCormick Harvester Co., later becoming electrical engineer of the Fort Wayne Electric Co., and subsequently holding the same position with the Westinghouse Electric & Mfg. Co. He began designing cars in 1905. In 1913 he was president and engineer of the Belden Engineering Co. and in 1914 became connected with the Packard Motor Car Co. He built one of the first six-cylinder motors constructed in this country and has been a member of the S. A. E. since 1913.

EDWARDS JOINS CHURCH

Chicago, Nov. 10—F. E. Edwards, Chicago, one of the most widely known men in American motor racing circles, has joined the Automatic Carbureter Co., Chicago, as efficiency engineer. His chief work at present will be the introduction of new Church air-lift fuel-feed system. Edwards has been chairman of the technical committee of the American Automobile Association and its chief technical representative for a number of years and has supervised the majority of the speed and economy tests during that time.

CUMMINS-MONITOR REORGANIZED

Columbus, O., Nov. 10—A complete reorganization of the Cummins-Monitor Co., has been effected by the incorporation of the Monitor Motor Car Co. with a preliminary capital of $10,000. This capital will be increased $1,000,000 in the near future, a large part of which will be paid in. The concern has been assembling and manufacturing two models for the last year and these models will be continued with slight changes. They are the four-cylinder, priced at $795 and the six-cylinder, priced at $995.

Sues on Springfield Type Body Patents

Massachusetts Concern Brings Action Against Fisher Corporation of Detroit

NEW YORK, Nov. 14—Springfield Body Corp., Springfield, Mass., has filed suit in New York against the Fisher Body Corp., Detroit, the Fisher company and Fred J. Fisher and Louis Mendelsohn, the latter holding controlling interest in the Fisher Body Corp., charging infringement of design of patents on Springfield-type body. Charges of unfair competition also are brought against the defendants.

The Springfield-type body is the convertible type of open sedan, which during the last year has been adopted by many motor car manufacturers. Its principle feature is the fact that it has a permanent roof and removable windows, thereby giving its owner an open car and a closed sedan body in one.

In the bill of complaint as filed, the Springfield Body Corp. charges that a style of body being built by the defendants is a copy of the design patented by the Springfield Body Corp., and developed by that concern. By its patent rights, the company claims exclusive right to produce and market the permanent roof and open sides type of body, which design it is alleged the defendants have appropriated and incorporated in their product.

STRIKE OIL IN JERSEY

Millville, N. J., Nov. 10—Lewis Steelman, the man whom many regarded as a dreamer when he started to drill for oil on his property at Cumberland, 4 miles from here, has at last struck oil and is making preparations to drill more wells.

Forming a syndicate, Steelman has gained control of about 60,000 acres of land adjoining his original property and drilling operations were commenced in the early part of the summer. Having reached a depth of about 1,000 feet, the drillers have struck a flow of from 5 to 20 barrels per day, but will go to twice the depth, if necessary, in an effort to strike a gusher. If this is unsuccessful, a return will be made to the present stratum and exploring will be resorted to.

CALIFORNIANS INDORSE ROAD BONDS

Los Angeles, Cal., Nov. 11—Fifteen million dollars for the completion of the state highway system is available in California as a result of the election. Overwhelming indorsement of the big bond issue was given, insuring the paving of approximately 1,000 miles of roads in addition to the 1,122 miles already finished at an expense of $16,000,000.

Initial work will be done on the trunk lines extending from San Diego to the northern boundary of the state. One-fifth of the sum voted will be devoted to the construction of new highways among which will be one north from Los Angeles into the famed Sequeia forests. These giant trees are said to be the oldest living things in the world and will be the terminus of a highway expected to surpass all others in California in scenic beauty.

McCULLA WITH OVERLAND

Detroit, Mich., Nov. 12—William R. McCulla has joined the engineering forces of the Willys-Overland Co. Mr. McCulla was formerly the aircraft motor engineer for the Packard Motor Car Co.

R. J. FIRESTONE FIRESTONE V.-P.

Detroit, Mich., Nov. 12—R. J. Firestone has been elected vice-president of the Firestone Tire and Rubber Co. Mr. Firestone was formerly the general sales manager and has been succeeded in that position by A. G. Partridge who was formerly the assistant general sales manager.

ASK SALE OF STANDARD BEARING

Philadelphia, Pa., Nov. 10—A committee consisting of 95 per cent of the creditors of the Standard Roller Bearing Co., which went into the hands of a receiver in 1913, has asked the federal court for an order to sell the property to pay the creditors. The sale has been objected to by some stockholders, who maintain that only the disposal of merchandise is necessary to meet all claims. Judge Thompson has decided to permit counsel to get together and draw a plan providing for a sale that will satisfy all claims and submit it to the court for approval.

ENTERS TRAFFIC-LAW FIGHT

Philadelphia, Pa., Nov. 10—The Automobile Club of Philadelphia, in the current issue of its Monthly Bulletin, comes out squarely and strongly for uniform traffic regulation. The opinions of the membership on the logical remedy for the present evils are summarized as follows:

First, only licensed drivers which have passed a rigid examination be allowed to operate vehicles on the highways. Licenses to be revocable at any time for any cause involving public safety.

Second, maximum speed limits, with restraining penalties.

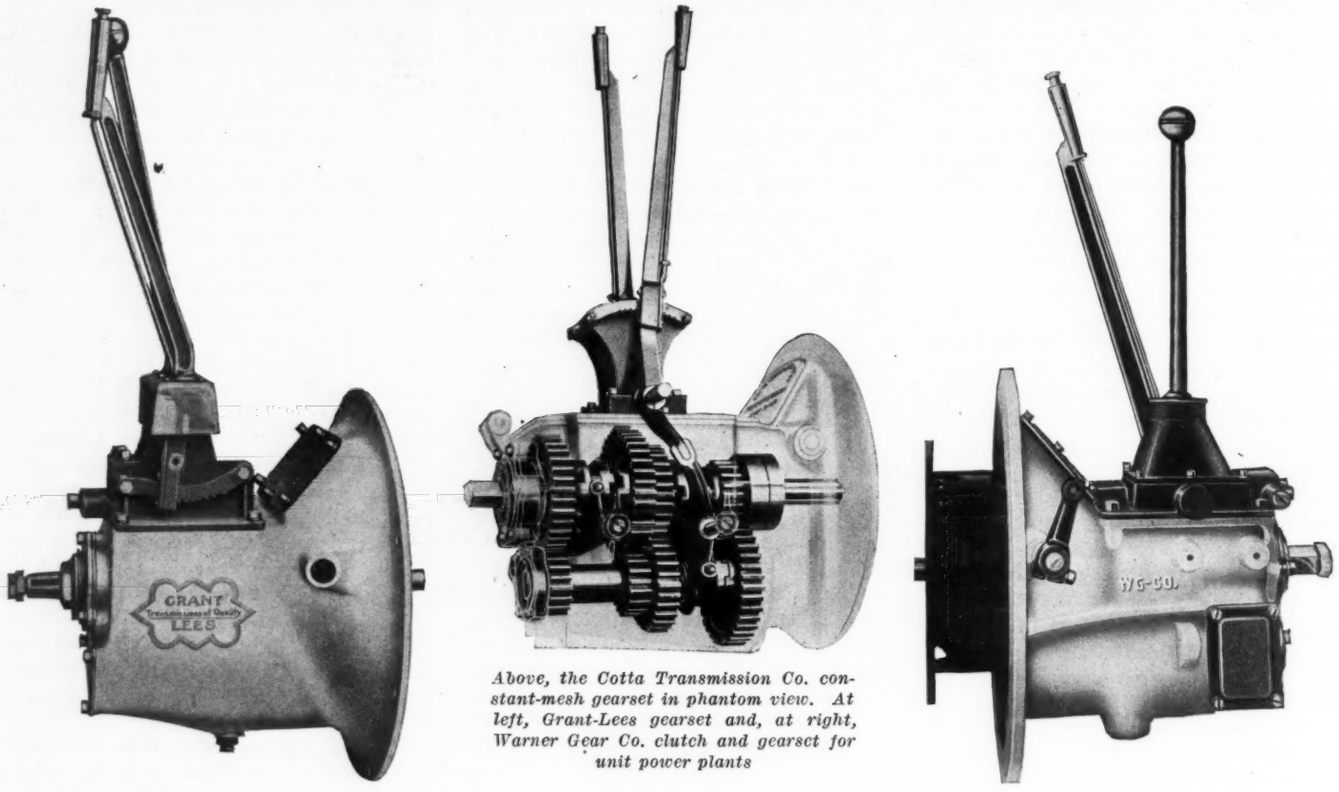
Third, pedestrians forbidden to intrude on highways except at crossings regularly marked and safeguarded.

Fourth, children restrained from playing on streets and roads used by motor cars.

The club favors a higher speed limit and greater provisions to insure careful rather than slow driving. Thirty-five miles an hour is declared to be a safe speed.

New Gearsets, Clutches, Steering Gears

The Year's Improvements in Power Transmission and Guiding Units—Greater Simplicity and Easier Maintenance Are Features



Above, the Cotta Transmission Co. constant-mesh gearset in phantom view. At left, Grant-Lees gearset and, at right, Warner Gear Co. clutch and gearset for unit power plants

IF THERE is one part of the motor car that, more than any other, has reached what for the time being may be considered the final stage of development, this unit probably is the transmission gearset. It is doubtful that there will be any radical changes in gearset design as long as the sliding-gear form of speed-changing mechanism remains dominant. Each year there are some noticeable minor variations in design, usually in the form of refinements which make for greater accessibility and easier maintenance—such refinements as are inevitable with the progress of an art which is on an established foundation and one which is not prone to be affected by variations in the public fancy.

During the season just past and those preceding it, alterations in construction or changes in basic principles have been remarkable for their absence. The leading tendency during the year has been a general trend towards simplification in the manufacturing processes and in the number of types produced by each factory. This simplification also has extended to the reduction in the number of parts and slight alterations in the design of others with which complication is done away with and at the same time weight reduced.

Increasing popularity of such additional features in connection with the gearset as transmission speedometer drive and tire-pump drive have caused some of the manufacturers to incorporate in their newer designs of gearboxes, arrangement for the attaching of these subsidiary drives. In some instances these have taken the form of additional gears, driven from the transmission gears, designed particularly for the take-off of power for the pump or speedometer.

Better Adapted to Unit Mounting

Gearsets have been improved in their adaptibility for mounting as a unit with engine and clutch. This is a natural consequence of the continued trend toward unit power-plant construction as has been emphasized by the increase in production of multiple-cylinder engines, most of which are of unit powerplant design.

Predictions in some quarters a few years ago that the general adoption of the unit power plant possibly would lead to the use of plain bearings throughout the gearset with pressure lubrication from the same oil pump as supplies the engine, have not materialized although such a development could logically be expected. The advantage of quiet operation is on the side of the plain bearing, but the difficulty of proper lubrication has rendered it impossible.

Consequently, the ball and roller bearings continue to be almost universal for both portions of the main shaft and most manufacturers recognize that their better efficiency probably makes up for the claimed advantage of noiselessness which is made for the plain type.

On the whole, there is little tendency to make any change in the type or arrangement of bearings. Brown-Lipe use taper roller bearings throughout wherever possible in its standard constructions. Warner considers the use of either plain bushings or straight roller bearings within the countershaft gears and in connection with a stationary countershaft to be growing in favor. Northway finds a trend toward the adoption of spiral roller bearings for the forward end of the main shaft and a double-row ball bearing in the rear. The American Die and Tool Co. has been using ball bearings throughout, its experiments with plain bearings on countershaft and spigot proving unsuccessful because of lubrication difficulties. For eliminating noise and reducing cost of manufacture this company recommends a combination of ball and roller bearings, or roller bearings throughout with a small roller bearing for the spigot.

The practical universality of center control in American cars has been of great weight in the simplification and lightening

of the gearset and its control apparatus. It has done away with the necessity of the rods, shafting, etc., which formerly were required to adapt the standard gearset to different chassis with different locations of control levers. Connections between the control lever and the gears have been lightened and shortened and shifting has become very simple so that the least possible motion now is required for shifting, and the distance of movement has been reduced so that the expenditure of energy on the whole is considerably less than in previous years. The stationary countershaft seems to be used to a greater extent than previously and either plain bushings or straight roller bearings are employed within the countershaft as a rule.

Interlocking devices designed to prevent meshing more than one gear at a time are most generally used, though methods of construction differ somewhat. Most of them using plungers which are pressed on the shifting rod by means of a spring and slip into notches when the gears are in mesh.

Development of multiple-cylinder engines has rendered the four-spaced gearset practically unnecessary, except as an additional refinement or a touch of luxury, and only a few of the high-priced cars are supplying more than three speeds. This applies to the passenger cars. For truck use, however, the four-speed gearset is becoming exceedingly popular particularly in 3½- and 5-ton trucks. Where the four-speed is employed on passenger cars, it nearly always provides a gear ratio higher than direct.

As to the types of the gears themselves, there seem to be considerable difference of opinion among the gearset manufacturers as to what pitch or width of face gives the quietest and most efficient operation. One concern employs a gear of finer pitch and narrower face as less likely to become noisy, holding that distortion is unavoidable during the hardening process when applied to gears with wide face.

Ease of disassembly and assembly has been one of the important aims of the gearset designer for some time and during the past year a number of concerns have made slight improvements in this particular, one of the most salient of which is the practice of having all the parts assembled outside of the case so that they go in as a unit and may be removed in the same way. With the now almost universal central location for the gearshift and emergency brake levers, control members are neatly and conveniently mounted on the cover plate of the gearset housing, which still further simplifies the task of disassembly. Another factor in this situation and one which simplifies to a great extent the matter of replacements, not to mention its accompanying reduction of expense in case of repair, etc., is the increasing adoption of separate units in the gearset which can be easily removed. Thus in case of stripping the teeth of one gear or some similar mishap, the car owner is not obliged to replace a large part of his gearset at considerable expense, as was formerly the case with some constructions.

Clutch Development

LIGHTNESS and minimum need of adjustment is the trend in modern clutch design. Manufacturers seem to be slowly edging toward the disk and in the disk construction they are using a fewer number of plates. The cone type is still well in the foreground, however, and in fundamentals it is the same as it has been for a number of years.

Simplicity is being gained in a fine degree. Adjustments in the cone type are becoming limited to spring tension alone, and lubrication is being performed automatically or through one or two easily reached grease cups. In many designs clutch wear, that is wear on the facing, is being taken up automatically within the assembly. In these automatically-lubricated and automatically-adjusted types if the driver handles his clutch reasonably, it is nothing uncommon for a distance of 50,000 miles to be covered without need of bothering with the clutch at all.

Ease of operation is becoming, or better has become, a factor. Improved methods of pedal linkage and reduction in the number of plates in the disk type, have made it much easier to throw out the clutch pedal. In the disk, the fewer plates require less motion of levers and as a result the same throw in the clutch with greater leverage performs the same operation as in the multiple-plate clutch.

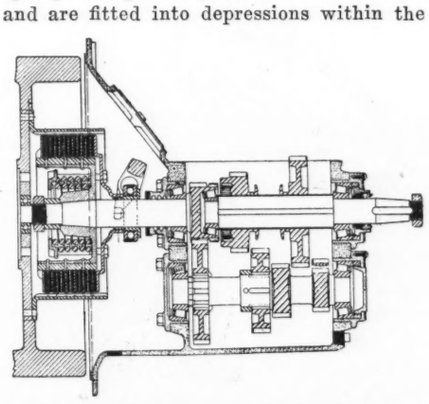
High-speed motors and increased rear-axle gear reduction have made lighter construction possible. In cone clutches aluminum is still well represented, but the pressed-steel spider is getting an increased following. The advantage, in fact the need, of light weight centers around the law of momentum. A heavy clutch will spin longer after release than a light one and the result is clashing gears and difficulty in shifting.

In cone clutches the grabbing feature is being done away with by insertion of bowed springs under the leather. These springs are generally about six in number and are fitted into depressions within the metal face. One make uses screws under the springs for adjustment, and it is the only adjustment provided.

The clutches, in most instances, are faced with a good-quality leather, but one large manufacturer is using a non-burning fabric running in a bath of oil. In disk types woven asbestos fabric has a preference. In the multiple type fabric is used alternately between metal disks.

Dry-plate disks are gaining over the types which operate in oil. The dry plate permits the use of fewer disks with equal ease of operation claimed because the friction is applied at a greater distance from the axial center of rotation.

Clutch brakes are still prevalent although some designs are getting along without them with a marked degree of success. Spinning of rotating members is prevented by a combination of quick-acting release which does not allow drag while releasing, and further by lightness of parts permitting the assembly to come to a stop quicker as previously explained.



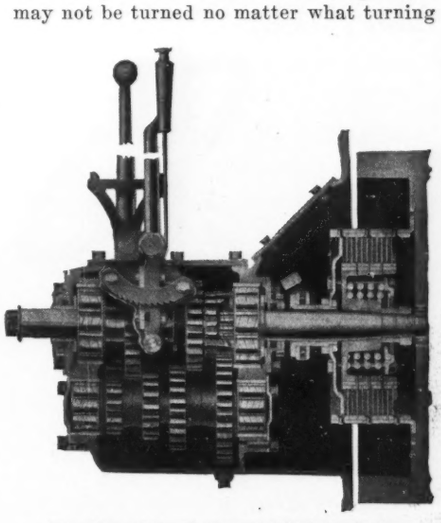
Brown-Lipe clutch and gearset in section, showing ball-thrust clutch bearing

Changes in Steering Gears

FUNDAMENTALLY, steering gears are now what they were 5 or 6 years ago. The principles are the same; the method of application and mechanical construction is refined. There is an apparent effort to releave the strain on the driver and to so perfect lubrication that the owner's neglect, which is a big factor in any part of a car which is not vitally concerned in the transmission of power to the rear wheels, is not going to mean a ruined gear until a good many thousands of miles have been traveled.

The mathematically perfect steering gear does not exist. It does not provide the compromises which are demanded in steering, such as quick action combined with minimum effort on the part of the operator and minimum strain on the mechanism.

The true irreversible steering gear is not to be desired, in fact, is not used. Irreversibility means that the steering wheel may not be turned no matter what turning



Phantom view of Covert clutch and gearset, showing use of spiral roller bearings

force is applied to the front wheels. Here again is a compromise. Complete irreversibility would make a car handle with difficulty in ruts, in other words the front wheels instead of following the ruts would climb out at every small angle in the rut. A reversible steering gear is as bad. Such a type would require constant application on the part of the driver in keeping the wheels straight with a resultant undue amount of muscular effort.

The compromise is brought about by friction created with the worm operating against the split nuts or wheel, whichever the design may be.

Weight a Factor

Weight and car speed are important factors in steering gear design.

A truck of great weight travels at slow speed. Because of the weight greater effort is required to turn the front wheels. Because of the slow speed, rapidity of steering action is not a requisite. Therefore, a greater reduction, in other words, more turning of the wheel, permits greater leverage and makes steering easier. With a light passenger car, where effort required to turn the wheels is much smaller and rapidity in operation is a big factor, the inverse applies.

As previously mentioned, the mechanical problem in steering gears is to reduce wear, this being accomplished by the proportions and grade of the parts and the facilities for lubrication. Wear comes first at the link joints at either end of the drag link and tie rod, then between the worm and gear or the nut and swivel joints.

The opinions of manufacturers vary regarding the grade of lubricant to use. Some advise heavy graphite grease, others light transmission grease and some embody plugs for the insertion of cylinder oil. In all instances, of course, the matter of importance is to keep the oil about all of the working parts. Keeping this oil retained for a long time, because it is next to impossible to get an owner to attend to the lubrication over once or twice a season, means a compact and oil tight assembly.

Wear in all the joints and gears has a trouble detector feature that the driver cannot miss. It all comes back to the steering wheel in form of lost motion or play. In this matter of play is another variance of opinion. Some manufacturers advocate that the play be maintained at zero or as near zero as possible. Others favor a play up to 1½ inches of revolution on the rim of the steering wheel, claiming that a slight play reduces shock upon the driver.

As this matter of the amount of play seems to hinge on the owners preference rather than on the theoretical correctness, practically all devices are provided with adjustment so that the play may be set at any amount desired.

When the play is in the steering gear itself, in the case of the worm and wheel type there are two adjustments possible. One method is to turn the eccentric bushing at the center of the wheel and the other is to turn the wheel itself, bringing a new surface into engagement with the worm. As the whole wheel is never used this gives the effect of a new wheel and thus new bearing surfaces.

Worm and Nut Adjustments

With the worm and split nut type, which is probably used on more different makes of cars than any other, the adjustments are indeed simple. The gears are generally adjustable for wear by an adjusting nut which is locked with a bolt through the housing cap, which latter is split at the place the locking bolt goes through. By screwing the adjusting nut down, any desired play may be regulated.

Mathematically the layout of the steering gear presents a problem with ramifications that are not approached in any other part of motor car design. The mere statement of the problem of getting two pairs of wheels, one stationary and the other movable axially, to roll around a given point without sliding, is sufficient to indicate the impossibility of ever securing in practice mathematically correct steering. As a matter of fact the variation from the perfect is not so great as would at first be supposed, and although it cannot be said that the past year's improvement has brought us any closer to it, still steering taken as a whole is not unsatisfactory.

Practically every motor car has the same type of steering so far as the system is concerned, the inventor of the conventional front axle with swivel heads at each end bearing the name Ackerman. With Ackerman steering it is generally assumed that the tie rod arms projecting from the swivels should meet at the middle point of the rear axle if their center lines are produced. Now, when on a curve the two rear wheels run along two circular paths of different radius, and each wheel makes a tangent to its rolling circle. The front wheels meanwhile roll on separate circles of their own and the ideal steering gear is such that each of the four wheels should make a tangent to the circle along which it is rolling.

Steering Gear Theory

This true rolling can occur at three positions only: One is the straight position when the car is turning neither to right nor left, and the other two are at some definite angle to lock to right and left respectively. The effect for all other positions is that three wheels may roll perfectly but the fourth must do some skidding or perhaps two roll and the other two divide the skid between them.

It is obvious that the rear wheels must both roll on concentric circles and that the rear axle center line produced must be the diametrical line of the circles. Thus neither one of the rear wheels can skid unless both do.

The practical geometry of steering gears involves a considerable amount of thought regarding the angles of the links and the intersections of link lines produced, and as stated, the result from a commercial standpoint must always be a compromise. The difference between really good steering, however, and that of the average car is so marked that any improvements which would tend to make practice line up to a closer degree with theory would certainly be welcomed by car users generally.

Jacox steering gear, a worm and nut type

Eclipse steering gear with balanced worm action

Warner worm and gear type for trucks

Features of Clutch Care

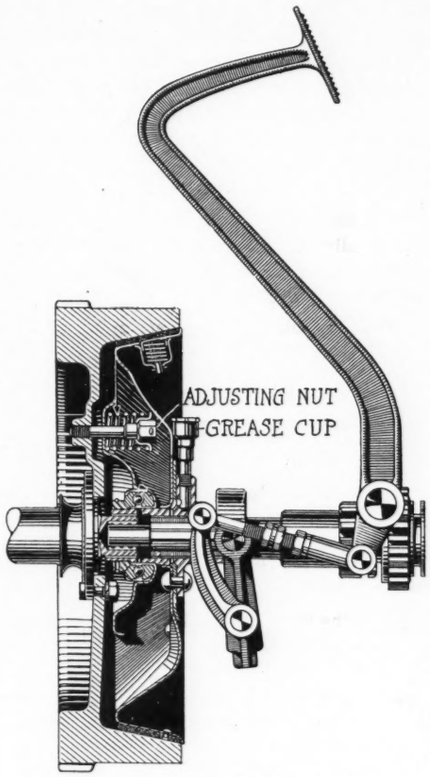
What to Watch and How to Make Adjustments

CONE clutches are found on more makes of cars than any other type, although the present tendency seems to be favoring the dry-disk type. A cone clutch is so simple in its operation and adjustment that there is little to say regarding its care, and still what small amount of care is necessary is as vital to the proper performance of the car as is the proper care of the motor or any other part.

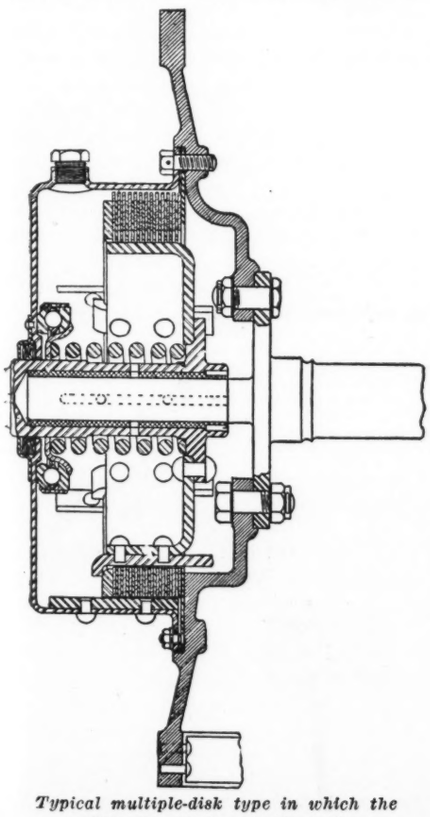
Cone clutches need oiling in the sliding surfaces and release mechanism and proper care of the friction facing. That is about all there is to it. A dry leather is to be avoided. An oil-soaked leather is to be avoided. It is a compromise between the two and here is the way to get it.

A dry leather will crack and burn easily. The cure is an application of neatsfoot or castor oil. This oil should be thoroughly worked into all parts of the leather and the excess removed. On the other hand, a clutch leather which has become soaked with lubricating oil or shiny and glazed from either a crust of oil or burning, will not hold. The remedy is to work Fuller's earth, powdered sulphur or even carbide ash into the leather. These materials will absorb the oil and remove the glazed surface.

The only adjustments necessary in a cone clutch are those which regulate the tension with which the leather is held against the flywheel face. This is provided in some designs with a main spring which surrounds the shaft which leads to the gearset and in others with small coil springs, several of them, around the inner flanges of the clutch spider and flywheel. In the main spring type an adjustment in the form of a nut which screws up against the spring is provided, but more often there is no adjustment at all. If the clutch persists in slipping, in this type, and a new leather facing will not cure matters, a new spring is about the only help.



Simple type of cone clutch in which tension is maintained by small coil springs between the flywheel and clutch spider flanges



Typical multiple-disk type in which the disks operate in a bath of oil

Reline the clutch with a leather from the manufacturers, if it is possible to obtain one. This is shaped to fit and is of the material which the manufacturers have found best suited to that particular car. If you must make the leather yourself, pattern it after the old one which you are replacing. The riveting process is a particular one. You should make sure that all rivets are thoroughly countersunk. The leather should be thoroughly soaked in kerosene before it is applied, as this will expand the piece and permit it to stretch on tight after it dries on the clutch face.

Something might be said of the method of handling a car and its effect on the life of a clutch facing. A driver who allows his clutch to slip continually is the one who is going to put on new leathers. It is far better to shift gears than to reduce speed or gain power by slipping the clutch.

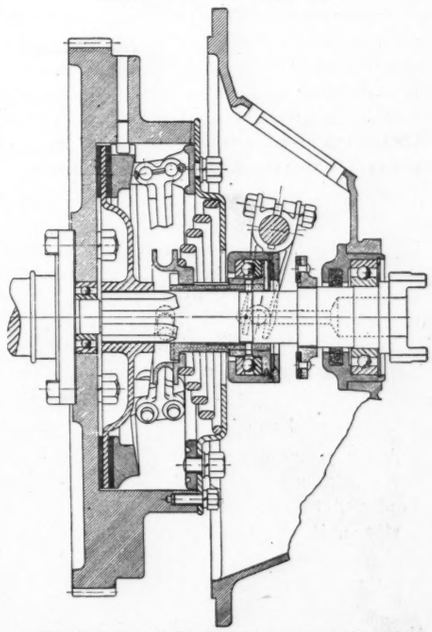
What most owners neglect is to keep the sliding member of the clutch properly oiled. Once this becomes loose from wear, there is an expensive replacement necessary. In some designs this is cared for automatically from the motor, but in most types it is lubricated from a grease cup or oil lead. The grease cups should be turned down every week.

The dry-disk clutch, which is being used in increasing numbers is probably the most simple of all to adjust. In the commonly-used type there are two bolts which fit into slots in the rear flange of the clutch housing. To increase the clutch tension it is only necessary to loosen the two bolts and shift them to the right, any tension desired being obtained by this method. The clutch must be held out when this adjustment is being made. This operation carried the levers and rollers of the clutch mechanism to new seats, giving a new bearing surface. It also carries them upon thicker sections of the thrust ring and thus gives a tighter adjustment.

The tension is maintained by a main spring which should last as long as the car and retain sufficient tension. If the spring fails, however, it is a simple matter to replace it by disassembling the clutch.

In the multiple disk type, in which the clutch plates run in a bath of oil, the adjustment is generally a nut directly behind the spring which turns up against it.

(Concluded on page 29)



Typical dry-plate disk type in which the clutching effect is created by wedging the plates

What to Do for the Gearset

Unusual Things that May Go Wrong—Method of Cleaning

IT IS the exception where the gearshifting mechanism and change speed mechanism gives up the ghost and leaves the car owner stranded. Its most common symptoms of derangement are noisy operation and trouble in shifting gears.

Taking, as the first case, difficulty in shifting gears, there are two main reasons for this, providing it is not caused by an ill-operating clutch. First the failure may be in the condition of the teeth of the shifting members. If these become burred over on the edge they become faulty in their fit with the gears with which they engage.

Second, considerable wear on the bearings may change the distances between centers of the main and counter gear shafts. Plain bearing gearsets are especially susceptible to this trouble. Such wear will alter the pitch lines of the meshing gears, possible to the extent that the teeth of one gear will strike on the side of the other below the bottom of the teeth. In such instances, replacement is generally necessary as there are few gearsets which provide for bearing adjustment. It might be added that, with proper oiling and cleaning out of the gearcase, and with careful shifting of the gears, there is no reason why any replacements should be necessary for the life of the car.

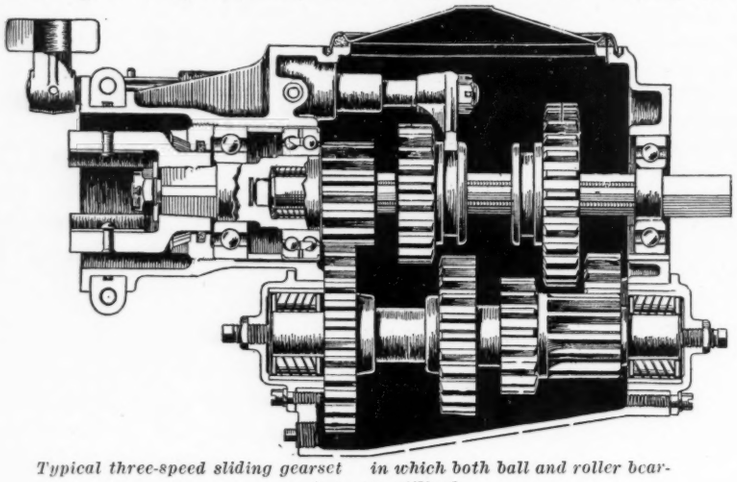
Gearsets, like all other parts of the motor car which are hard to get at, commonly suffer from improper lubrication. In very near all of the sliding gearsets now in use, a flowing oil is the most satisfactory lubricant. The grade of oil to use is one which is almost at the point which differentiates liquid and solid—so heavy that it will just flow. A steam cylinder oil answers the requirements. Hard grease, in most types, is not to be desired, because the gears will cut paths in the grease and not become lubricated again until the heat generated by them running dry will cause the grease to soften and run into the gears.

After a motor car has been in hard service for some time, if dog clutches are employed to effect the various speed connections, it is often found that the contact edges of these dogs become badly worn and rounded off. This condition is often prematurely brought about through the use of poor judgment or carelessness in shifting the high-speed gears, or as the result of a dragging clutch.

When the dogs become so worn that they cause the gear to slip out of engagement while the car is in operation, they may be dressed up, that is, the edges may be squared by grinding.

Do not let garagemen anneal gears to grind them or straighten up the dog teeth. These gears are heat-treated under very accurate conditions of temperature best suited to the grade of material, and no mechanic with an ordinary forge is going to treat them again and get them back into the correct hardness.

In gear boxes where the shaft ends are supported by single row ball bearings with no provision for end thrust, misalignment of the bearings at the end of the shaft may cause noisy action, the pressure caused by the misalignment creating an end thrust in the ball bearing. The only remedy is to renew the bearing.



Typical three-speed sliding gearset in which both ball and roller bearings are utilized

In most gearsets an interlocking plunger device is fitted to the shifting rods to aid in keeping the gears meshed. V-shaped slots are cut into the upper surfaces of the shifting rods and ball bearings suspended at the end of coil springs within the interlocking plunger are forced, by the effort of the springs, into the slots at different shifting positions. It is very often the case that one of these springs becomes broken or depressed with the result that the tension is lost and the gears fly out of mesh when under load. A new spring in case of a broken one or a lengthening of the old one will afford a remedy.

Gearsets should be thoroughly washed out three or four times a season. To do this drain all oil out through the drain plug in the bottom of the gearset case. Then reinsert the plug and fill the case with kerosene. Jack the rear wheel and run the motor through all gears. This will work the kerosene through the teeth. Then drain the kerosene and fill the case with clean oil to the specified level.

The replacement of worn parts in a gearset should not be attempted by one who is not thoroughly familiar with the operation. Proper alignment and adjustment is vital, and it takes an expert to produce these results.

The gearset illustrated depicts the use of both ball and roller bearings with adjustments provided for taking up end play.

End play may be discovered by grasping the universal directly behind the gearset and attempting to shove it forward and back. If a looseness is found adjustment is needed. It is well to make this test at least twice a season because, once end play developes, it will increase rapidly and possibly end in stripped gears.

Whether clashing gears may be the fault of a faulty clutch or something wrong in the gearset case may be determined by removing the plate over the clutch and, with a rear wheel jacked and the car in gear, letting the clutch in and out. If the clutch continues to spin after it has been thrown out you should look to the clutch brake or too close a clutch adjustment.

If the clutch is operating properly the trouble is internal and may be attributed to the ailments previously described.

TO CURB MOTOR FIRE FANS

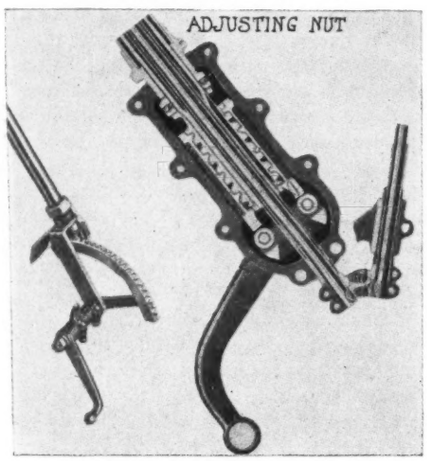
Bloomington, Ill., Nov. 13—An element of danger which appears to be increasing here and elsewhere throughout the country, and which has been officially acted upon by the Bloomington city council, following a suggestion from the chief of the fire department, relates to the practice of car drivers setting the pace for the fire apparatus en route to a conflagration. Some car owners are in the habit of either preceding the fire department or else following so closely behind and maintaining the same rapid gait of the apparatus. At the scene of the fire, these cars frequently get in the way of the firemen and interfere with the handling of the hose. Another menace, lies in the parking of cars too near fire plugs, hampering the work of the firemen and, when the cars run over the hose, damaging the property of the city. The Bloomington council has instructed the chief of police to prosecute every car owner who took advantage of an alarm of fire to exceed the speed limit.

Steering Gear Maintenance

Method and Amount of Adjustment—When to Lubricate

WHEN a steering gear becomes loose it speaks for itself. In other words, the looseness immediately shows in the steering wheel by an excessive amount of lost motion. A general checking through of the steering system will show one just where the trouble lies. If in the ball joints at the juncture of the pitman arm and steering arm, there is generally an adjustment in the form of a bolt which reduces the area of the ball retainer. If all is tight below the steering gear and there is still an excessive amount of play the trouble is, of course, in the gear itself.

There are three generally used types of steering gears, the worm and nut, the worm and wheel and the bevel type. Taking the simplest first, the bevel type requires very little care and what there is is so evident to anyone who will look at the device that there is little need of description.



Two types of steering gears; on the left the simple bevel-gear type, and on the right the worm and nut gear

Enough to say that the oil cups which lubricate the pinion bearing and the steering arm bearing should have their due attention. A filling and emptying at least once in two months and preferably twice that often. There is generally an adjustment just above the pinion bearing with which all lost motion can be gathered in.

In the worm and wheel type, there are generally two adjustments, one which operates on the worm, the tightening of which eliminates up and down motion of the worm, and the other in the form of an eccentric bushing which supports the steering arm and wheel.

The first mentioned adjustment is generally a nut on top of the steering gear housing as shown in the illustration. By screwing the nut down the thrust bearings are brought together and up and down motion is removed. The eccentric bushing, which is generally held in adjustment by a locking bolt, permits the wheel to be turned farther into the worm, thus giving a closer engagement of the teeth and taking up the lost motion.

Any steering gear is difficult to lubricate, and furthermore, requires more lubrication than is generally appreciated. The difficulty in oiling is that there is practically no pumping action. As a result, the steering gear housing should be kept very nearly full of grease at all times. Some manufacturers recommend light transmission grease, others heavy graphite. Either lubricant will work well if it is kept packed in. This is important. Keep it packed in. Not enough grease means a partially dry worm.

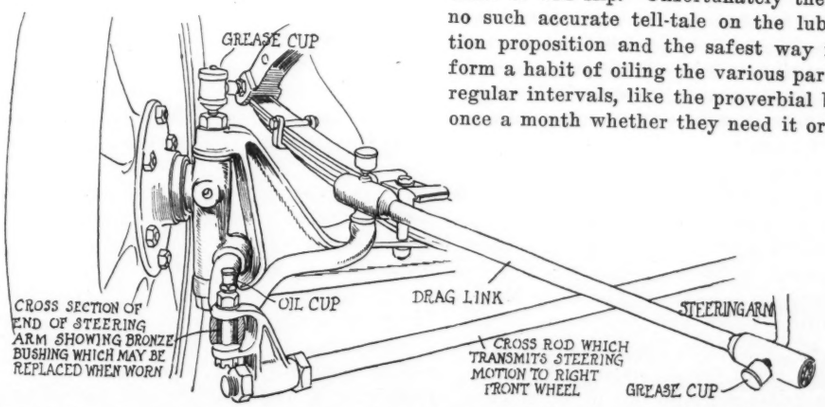
The worm and nut type has one adjustment. This is in the form of a nut on top of the housing, locked with a locking bolt, which applies pressure to the nut by drawing together a slotted portion of the casting. In this type there are two half nuts which surround the worm. The adjustment removes up and down motion in these half nuts. When the adjustment cannot be made with the nut, the worm may be reversed and a new bearing surface will be created. This adjustment is not possible in all makes.

Limits of Adjustment

Adjustments in all types, providing the wear is not excessive, allow adjustment from very nearly zero to a matter of 2 inches or more on the rim of the steering wheel. Motor Age does not recommend a certain amount of lost motion. It is a matter of driver's preference and steering gear makers themselves grant that no standard can be set.

A very tight adjustment inflicts a strain on the driver, because the steering gear, being slightly reversible, transmits road shocks to the driver's hands and arms, which might be taken up in the slight play of the steering wheel. It might be said that 1½ inches on the steering wheel is the average amount of play.

On the other hand an adjustment which allows too much play is dangerous when quick turning is necessary.


GREASE CUP
CROSS SECTION OF END OF STEERING ARM SHOWING BRONZE BUSHING WHICH MAY BE REPLACED WHEN WORN
OIL CUP
DRAG LINK
STEERING ARM
CROSS ROD WHICH TRANSMITS STEERING MOTION TO RIGHT FRONT WHEEL
GREASE CUP

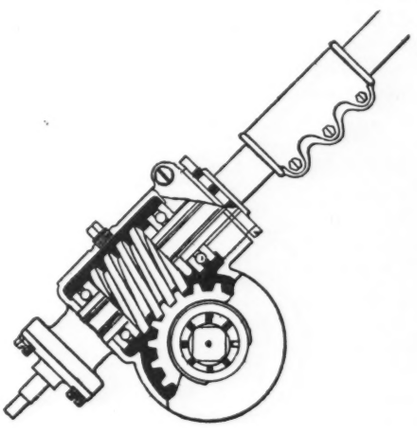
Typical layout of steering mechanism showing conventional location of parts which require periodical attention

Clutch Care

(Concluded from page 27)

After years of service the main spring may become weak and it can be removed and stretched out successfully.

Practically all makers of multiple-disk clutches which operate in oil recommend light motor oil. A heavy or gummy oil will gather on the plates and cause them to slip. It is a bad place to put poor oil. Gummy plates can be cleaned by bathing the clutch thoroughly with kerosene, allowing it to stand over night with the coal oil thoroughly covering all of the plates. This oil should then be drained out and clean lubricant inserted.



The worm and wheel type of steering showing the eccentric suspension of the wheel shaft

The driver of a car always knows whether the clutch needs adjustment, because it will slip. Unfortunately there is no such accurate tell-tale on the lubrication proposition and the safest way is to form a habit of oiling the various parts at regular intervals, like the proverbial bath, once a month whether they need it or not.

Clutch, Gearset and Steering Gear Adjustments on Leading Car Models

Ford

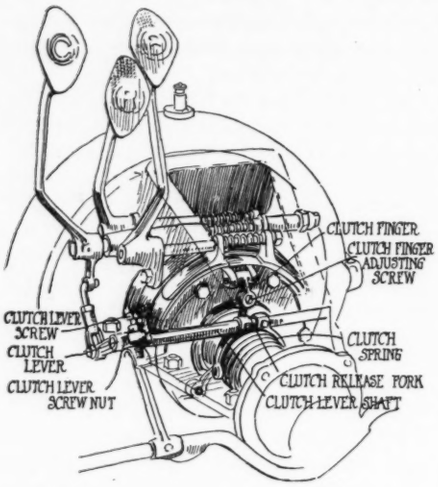
CLUTCH—The clutch used in the multiple-disk type and the adjustment is very simple. By removing the plate on the gearset cover, under the floorboards at the driver's feet, an adjustment screw is revealed at the end of the clutch finger—see the illustration. To make the adjustment remove the cotter pin and turn up the set screw about one-half turn with a screw driver. Turn the clutch over and repeat the operation on the other finger set screws. Be sure to give each the same amount of turn and do not fail to replace the cotter pins. After considerable usage of the car it will be necessary to replace the clutch disks.

If the car has an inclination to creep forward when cranking it indicates that the clutch-lever screw shown in the figure, which bears on the clutch leather cam, has become worn and requires an extra turn to the right to hold the clutch in neutral position. The clutch is lubricated from the motor oil.

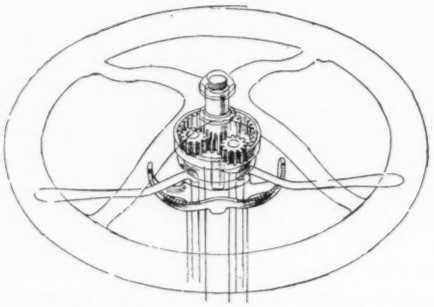
Gearset—The slow-speed band is tightened by loosening the locking nut at the right side of the gearset cover and turning the adjusting screw clockwise. To tighten the brake and reverse bands remove the gearset case cover door and turn the adjusting nuts on the shafts to the right. Be sure that the bands do not drag on the drums when the controlling pedals are disengaged. These will exert a braking effect and tend to overheat the motor. The bands, when worn so that they cannot be made to take hold properly, should be relined.

To remove the bands, take off the door on top of the gearset cover and turn the reverse adjusting nut and brake adjusting nut to the extreme end of the shafts which are operated by the pedals. Then take out the slow-speed adjusting screw. Screw out the bolts which hold the gearset cover to the crankcase and the cover assembly may be lifted off. The band nearest the flywheel may now be slipped over the first of the triple gears. After this is done, turn the band around so that the opening is facing down.

The band can now be pulled out. Each band is removed by the same operation, and by reversing the operation they may be installed again. After the bands have been placed in their upright position on the drums tie the ears of the three bands with string which will hold them in the center so that, when the gearset cover is placed on there will be no trouble in getting the pedal shafts to rest in the notches in the ears of the bands. The clutch release ring must be placed in the rear groove of the clutch shaft. When the cover is in place the string may be removed.



Pointing out parts of Ford clutch and gearset that need owner's attention



The Ford steering gear is a simple apparatus in which lubrication once or twice a season is the only attention necessary

The Ford gearset is thoroughly lubricated from the motor oil and needs no other attention.

Steering gear—The Ford steering gear is simple and needs very little care. The post gears which create the reduction in gearing, need oiling with a hard grease, about once a season. To get at them, remove the nut on top of the steering post, drive the wheel off with a hammer against a block of wood, loosen the set screw which holds the brass cap and screw off the brass cap.

If the steering gear develops an excessive amount of play, the small pinions may have become worn so that they need replacement, or the ball in the ball and socket steering joint may have become badly worn. This latter is adjustable by disconnecting the two halves of the ball socket which surround the ball arm at the lower end of the steering post and filing off the surfaces until they fit snugly around the ball. The ball caps at the other end of the steering gear may be tightened in the same manner. The location of the steering gear pinions are shown in the sketch on this page.

Overland

Clutch — The Overland clutch is the leather-faced cone type and the care of the leather, renewal, etc., is covered in another article in this issue. The clutch tension is maintained by three powerful main springs. In removing them there should be some means of wedging against the spring to let them out easy, getting a pry against the spring-bolt end. The pressure with which the cone is held against the flywheel may be adjusted by increasing or decreasing the tension of these clutch-operating springs. Turning the adjusting nuts increases the tension and turning them out decreases it. Each should be turned as near the same amount as possible.

The clutch rollers, which disengage the surfaces, must be kept well supplied with hard grease. The grease cups should be emptied by turning down at least once a week.

There is an oil hole leading to the ball thrust bearing, as shown in the sketch, which must be supplied with flowing oil. It may be easily reached by thrusting the nozzle of an oil can through the clutch spokes. This should be lubricated at least every 500 miles.

Gearset—The rear axle Overland gearset is a conventional three-speed selective type. The ball-bearing main-shaft suspension has no adjustment, and, if properly lubricated will outlive the car. If the bearings do go wrong their replacement should be left to an expert repair man, according to the factory advice. Lubricant should be added at least once in 2 months and preferably once a month. Twice a season or oftener the gearset should be flushed with kerosene and drained through the plug on the bottom.

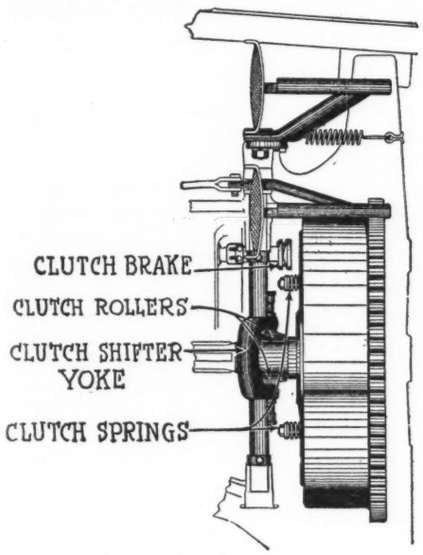
Steering gear—A play of 1½ or 2 inches in the steering gear makes driving easier, because it relieves the operator of the jerks caused by rutty roads, etc. Greater lost motion than the above should be taken up as follows:

Loosen the clamp bolt which clamps the steering column adjusting nut and turn the hexagonal adjusting nut shown, in the figure, to the right until all up and down motion of the steering column has been eliminated. Then, turn the steering wheel to the extent of its travel in either direction, and after loosening the nut on the eccentric bushing clamp stud, turn the eccentric bushing until all motion between

the worm and the worm wheel is taken up. Then clamp the bushing tightly again. If it is impossible to reduce the lost motion by the adjustment of the eccentric bushing, remove the steering arm from the worm wheel shaft, rotate the worm wheel through a quarter of a turn and replace the arm in the new position. This will create a new bearing surface. The steering gear is lubricated by hard-grease through the grease cup and this cup should be filled and emptied every 100 miles.

Studebaker

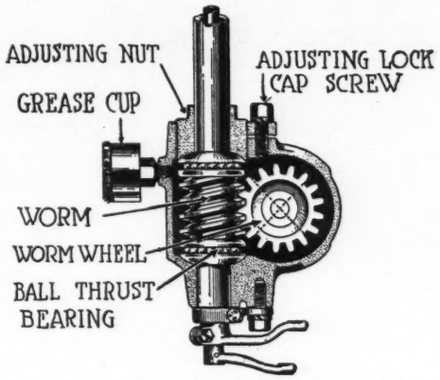
Clutch—The Studebaker clutch is of the leather-face cone type to which general rules for the care of the leather, renewals, etc., given elsewhere in this issue, apply. The clutch bushing is lubricated by an oil lead, bored through the center of the crankshaft which takes lubricant from the oil reservoir of the motor. If, after long service, new linings on the clutch fail to



Overland clutch showing adjustments for taking up wear

make the device hold properly, the remedy is to remove the main clutch spring, which can only be done by completely disassembling the unit, and either increasing the tension of this spring by stretching it out, or replacing it. On rare occasions these springs will break, and of course the only remedy is to replace the spring.

Gearset—The Studebaker sliding gear is a unit with the rear axle and is of conventional selective three-speed type. After a great deal of service the gearset pinion shaft may need adjustment in the suspending bearings. To determine whether or not adjustment is needed endeavor to push the universal back and forth and if the shaft shows play where it enters the gearset case, it indicates that the roller bearings need taking up. The operation is performed through the pinion shaft adjusting nut. This nut is locked by a pawl and the pawl, in turn, is locked by the lock bolt which holds the adjusting nut. Loosen the nut on this bolt and the pawl can be removed from the adjusting nut. To make



Parts in Overland steering gear which need care

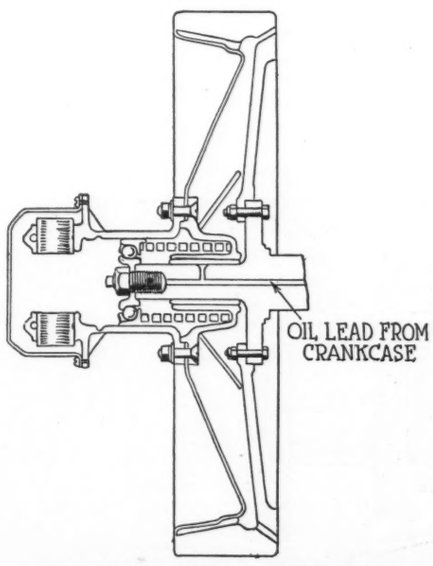
the adjustment, turn out the adjusting nut until the play between the shaft and gear-case disappears. It is not necessary to draw the nut up excessively tight. When the operation is completed, lock the units in the inverse operations by which they were unlocked.

A light gearset grease is advised for oiling. The gearset case should be thoroughly washed out at least twice a season and new grease put in. Of course, the case should be kept well filled with lubricant at all times.

Steering Gear—Provisions have been made for adjusting end play in the Studebaker steering column by turning the nut on top of the steering gear housing. Turning it down takes up the play.

In the steering gear housing there is located an oil plug, as shown in the illustration. By removing this plug grease can be forced into the housing with a grease gun. Grease should be put in about every 1,000 miles.

Directly above the plug is a grease cup which lubricates the worm-shaft bearings. Also, at the end of the worm-wheel shaft there is another grease cup. This is directly outside of the frame. Each of these cups should be emptied every 1,000 miles, of course being turned down at regular



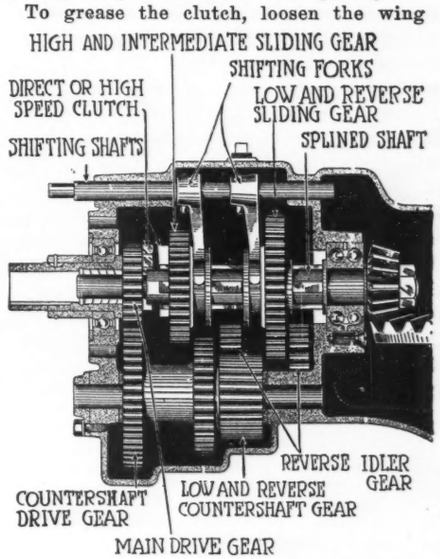
The simple Studebaker clutch. Tension is maintained by one main spring

intervals. The locations of grease cups, oil plugs and adjusting mechanism are shown in the sketch.

Buick

Clutch—Buick gains power transmission from the motor to the gearset through a simple cone clutch. Here again, the regular antidotes for slipping clutch caused by a worn, oily or burned leather apply. A worn leather may be made to hold by increasing the tension on the four large clutch springs within the clutch spider. In doing this be careful to turn the nuts exactly the same amount. When the lining of the clutch brake becomes worn, thus allowing the clutch to spin after disengagement and make the shifting of gears difficult, adjust by loosening the clamp bolt and turning the adjusting nut to the left or counterclockwise. This will compress the brake spring sooner and consequently stop the clutch more quickly.

To grease the clutch, loosen the wing



Overland gearset showing bearing suspension and list of parts

nuts and remove the cover of the clutch housing. Give the grease cup on the clutch release ring a turn or two. Press the clutch pedal and turn the clutch cone around until that grease cup appears and give it a turn or two. Turn the motor over until the grease cup on the clutch spider appears and turn that down the same amount. Apply a few drops of flowing oil to the clutch release yoke trunnion bearings. This operation should be performed every 500 miles.

Gearset—The main shaft of the Buick gearset is ball-bearing mounted. To lubricate, it should be filled with steam-cylinder oil, which is about the heaviest flowing oil obtainable, and to do this the filler cap on the right side of the gearset case must be removed and the case filled to the level of the opening.

Steering gear—The steering screw is provided with a ball-thrust bearing at its upper end and an adjusting nut, by means of which lost motion may be taken up. For best results, the factory recommends that

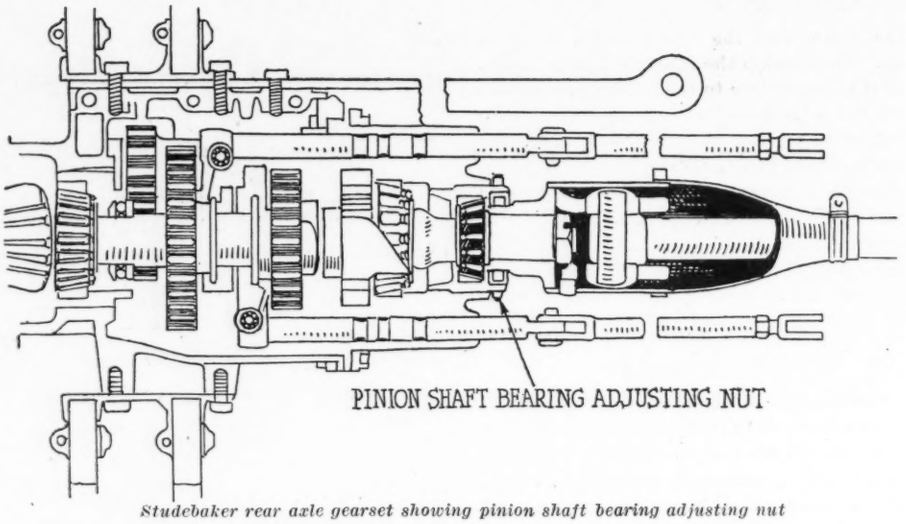
the steering wheel should not have over 1½ inches of lost motion in its rim. The adjusting nut is, of course, turned down to take up play.

An old plug is provided in the gear housing and this housing should be kept constantly filled with very heavy flowing oil. There is a small oiler in the hub of the steering wheel which lubricates the upper bearing of the steering tube. A few drops of oil should be inserted here every 500 miles or so. The ball joints of the steering connecting rod should be kept packed with a soft cup grease, one cupful to be screwed empty about every 500 miles.

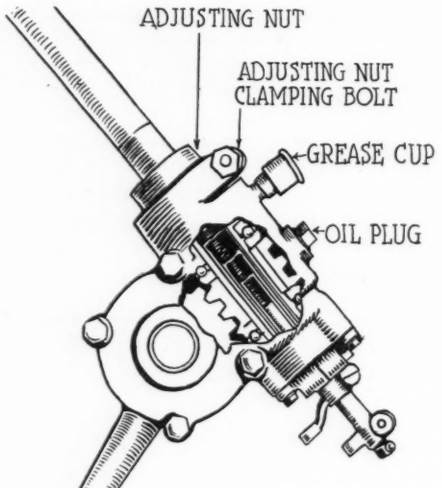
Dodge

Clutch—To tighten the Dodge clutch; first, remove the clutch cover plate, then loosen the clamp screw on the clutch-adjusting nut and with a screw driver turn up the clutch spring adjusting nut until the spring is compressed enough to make the clutch hold properly. This clutch spring adjusting nut may be found directly below the clutch-throwout fork, and can be reached by a long screw driver. After adjusting, one should be sure that the clamp screw is tightened down securely, as otherwise the nut might back off when the car is running. The clutch yoke grease tube should be examined often to see that it is not clogged up or has not worked loose. Keep the drain hole in the bottom of the clutch housing free so that oil cannot accumulate and get into the clutch leather. The grease cup which holds lubricant for the clutch throwout yoke should be turned down a cople of turns every 50 miles, when the motor is in motion.

Gearset—The gearset main sliding-gear shaft is mounted on ball bearings at either ends and looseness means replacement of the bearings. The countershaft is mounted on bronze bearings. If the gearset is kept properly lubricated with clean oil none of these bearings should need replacement in a good many thousand miles of driving.



Studebaker rear axle gearset showing pinion shaft bearing adjusting nut

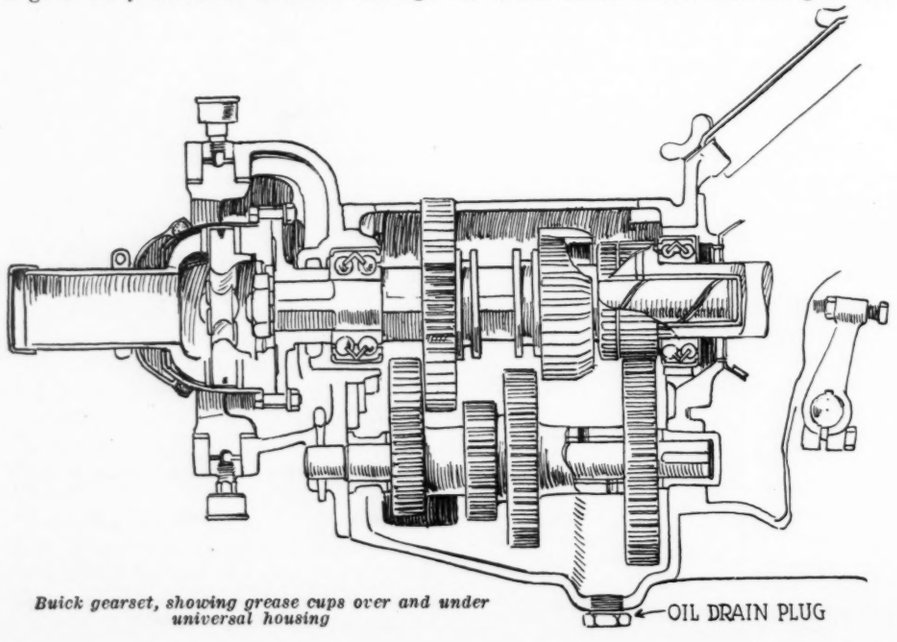


Cut-away view of Studebaker steering gear showing adjustable feature

Not more than 3 quarts of gearset lubricant should be used in the case. The level should be inspected every 1,000 miles and, if it has fallen so low that the gears on the main shaft do not dip well into the lubricant, the supply should be replenished so that they do. The level should be kept ½-inch below the main sliding-gear shaft.

Steering Gear—To take up end play in the worm shaft of the Dodge steering gear, loosen the gear shaft connection and the set screw and check nut on the adjusting nut at the top of the steering gear case. Then screw this adjusting nut down until all play is removed. Be careful not to tighten the nut so much that the steering gear will bind. Tighten all you have loosened, after the adjustment has been made. To remove any play which may develop between the worm and the worm wheel, the adjusting plate of the worm wheel shaft eccentric bushing can be turned until the worm wheel is driven into closer mesh with the worm. After much wear, further adjustment can be made by reversing the adjusting plate. After long usage, the steering-lever arm can be disconnected and the worm turned end for end and reinserted.

Pack the steering gear case with grease, graphite grease is advised by the factory, every 1,000 miles.



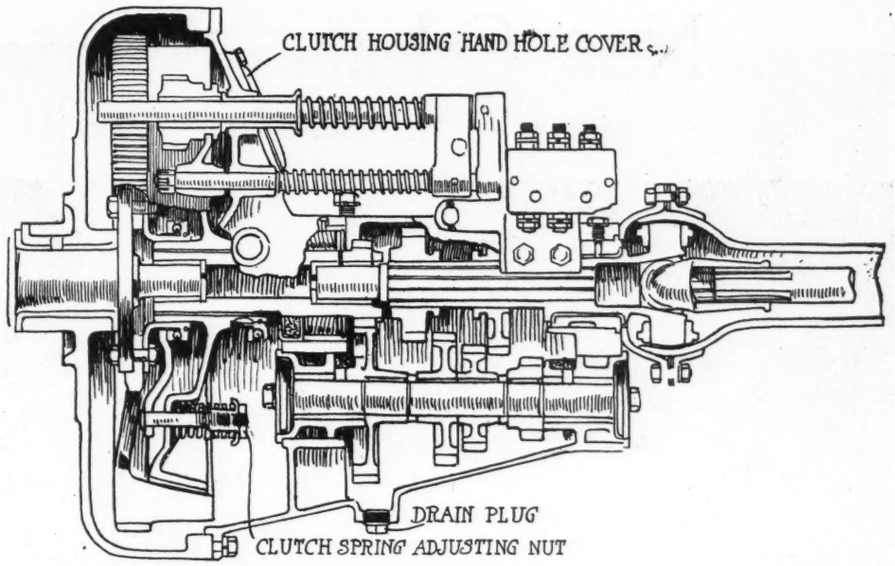
Buick gearset, showing grease cups over and under universal housing

Maxwell

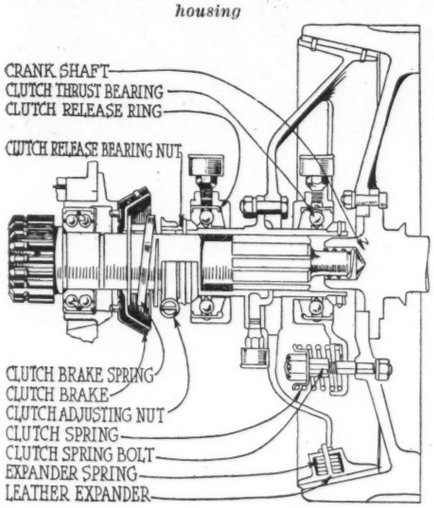
Clutch—The clutch used in the Maxwell is a cone type faced with a fabric composition, and runs in a bath of oil. To remedy slipping in the clutch, providing that the fabric facing has not become worn down excessively, remove the hand-hole cover from the forward top of the gearset case and take up tension on the three springs. Each spring should be tightened an equal amount. A grabbing clutch probably means lack of oil or possibly that there is too great a tension on the springs.

The clutch housing should contain from 1 to 1½ pints of lubricant. Ordinary motor oil will give the best results. This oil may be inserted through the inspection plate on top of the clutch housing and should be renewed every 2,000 miles, the old oil being drained out through the drain plug on the bottom of the housing. It is well to flush the clutch with kerosene at

The Buick steering gear is adjusted by turning down the nut on top of the housing



Cutaway sketch of Maxwell gearset and clutch. The clutch-adjusting nuts are shown



Buick clutch showing adjusting feature and parts which need oiling

this time. Fresh, clean oil should be inserted after the flushing.

Gearset—The Maxwell gearset is conventional sliding gear, three speeds forward and reverse. Bearings are non-adjustable, but if properly cared for should not need renewal.

To oil the gearset, remove the filler plug in the top of the gearcase cover and pour in a very heavy flowing oil, preferably a steam cylinder oil, until the lower or countershaft gears are about half covered. When the case is empty this will require about 1 quart of oil. Do not use hard grease.

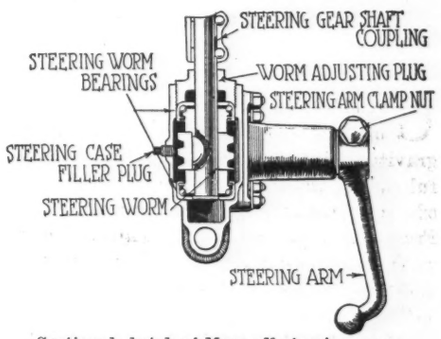
Steering Gear—The steering gear is of the worm and gear type and has two adjustments. If an excessive amount of end play or lost motion exists, remove the two upper clamp bolts in the steering-gear shaft coupling and pull the steering wheel and shaft upwards. Then unscrew the steering arm clamp nut and remove the steering arm with the worm wheel shaft. The steering gear worm adjusting plug clamp screw should then be loosened and, while turning the steering gear with a hand on the coupling about a quarter turn to the right and left, tighten the plug until the play is taken up.

If there is still lost motion in the steering wheel, remove the steering arm and turn the wheel until the steering arm clamp has rotated a quarter turn and replace the steering arm, thus giving the gear and worm a new bearing surface.

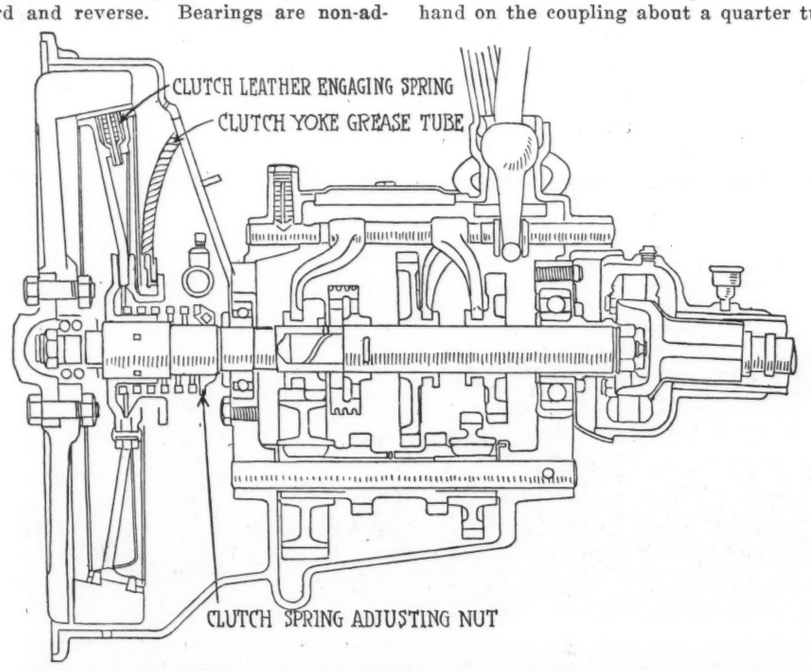
The steering gear filler plug on the side of the housing is for admission of soft cup grease and the easiest way to fill the housing with lubricant is to insert it with a grease gun. This housing should be packed monthly.

General

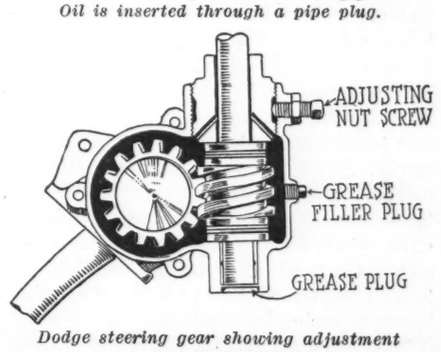
Unless you are thoroughly familiar with gearsets do not tamper with them. Replacement of bearings is a job for an expert repairman.



Sectional sketch of Maxwell steering gear. Oil is inserted through a pipe plug.



Cutaway sketch of Dodge gearset and clutch. The clutch-adjusting nuts are shown



Dodge steering gear showing adjustment and method of oiling

New Orleans—*America's Paris*

In Two Parts—Part II

This panorama portrays City Park in New Orleans, which is undoubtedly one of America's most beautiful city playgrounds. Here every facil[ity] for outdoo[r] people the year around. In this park is said to b[e] the finest [g]

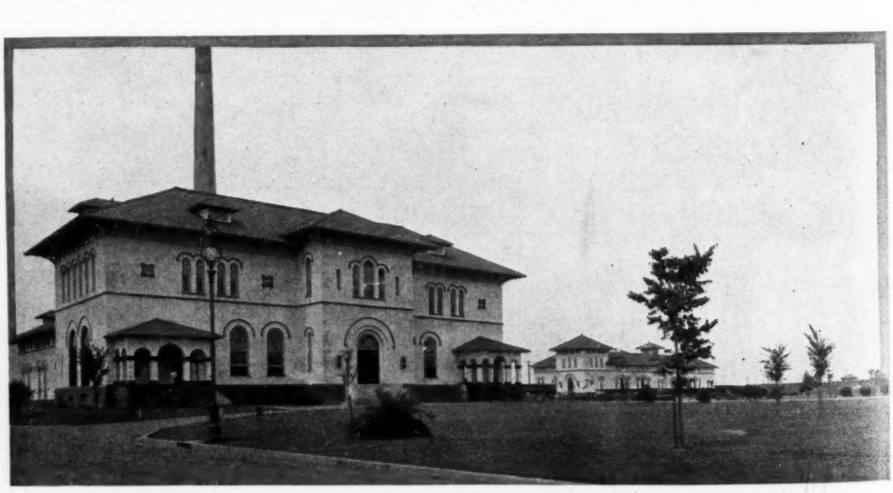
This is a typical street scene of stately palms in New Orleans

By William K. Gibbs

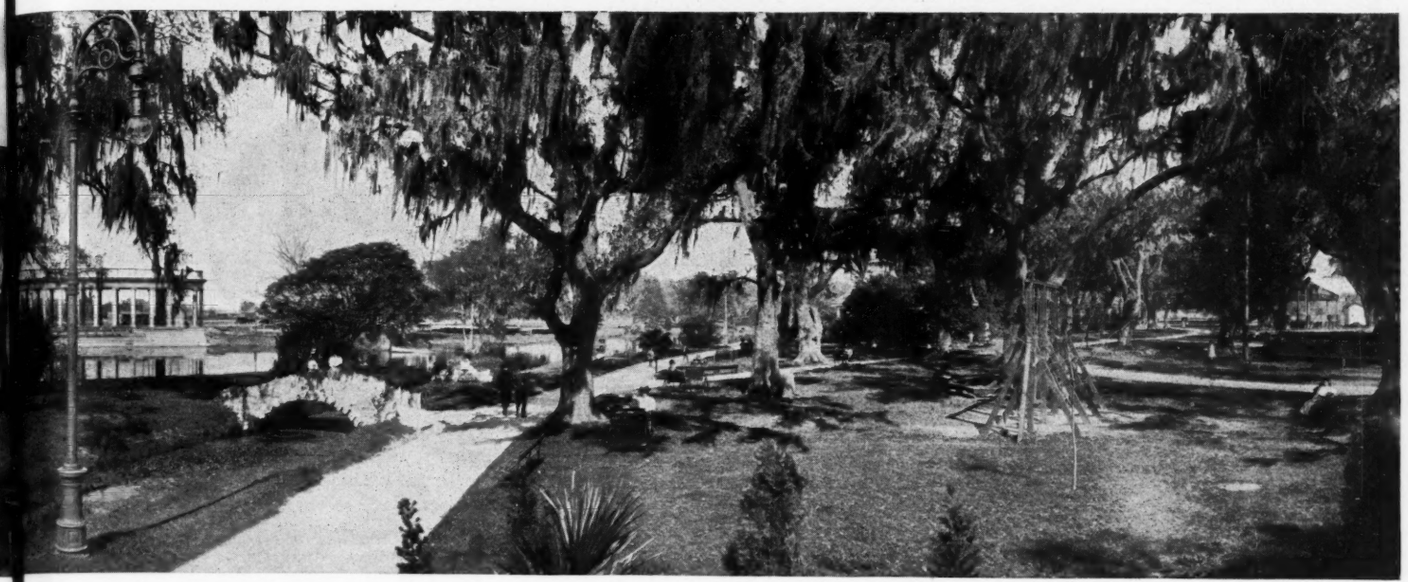
GETTING away from the old-world side of New Orleans the tourist naturally gravitates into the far-famed and beautiful garden district, as that interesting part of the Crescent city, exclusive of the French Quarter, is so aptly termed. This is the residential portion and its distinct southern characteristics are all new to the northern guest. In it are located many of the public buildings of note and palatial mansions and homes of the New Orleans aristocracy and people of wealth. Here, set in velvety lawns, bowered in a wealth of tropical plants, are homes that for elegance, artistic treatment and comfort have few equals on the American continent. Wide, cool verandas, or galleries, as they are called in the southern vernacular — draped with fragrant yellow jessamine, wisteria and cloth-of-gold rose vines add to the picturesqueness of the New Orleans residence a touch of beauty which leaves a lasting impression.

The principal residence street is St. Charles avenue, a broad, asphalted boulevard, 7 miles long, beautifully shaded, lined with estates representing the highest type of the architect's art and the landscape gardener's skill. Opening into the street are a number of residence parks where costly houses, surrounded by superb gardens, all grouped into charming pictures. The floral display in these pretentious gardens is very gratifying to the eye. Winter or summer the garden district of New Orleans is very near to Nature. Roses are to be seen blooming in January, while the riot of color and prodigal abundance of flowers in the warmer months makes this side of New Orleans a veritable garden of paradise.

It is a thought common to most people that New Orleans is a marsh, or swamp, but you would scarcely know it today unless you get outside of the city to the south and see the character of country upon which this southern metropolis was built. Originally the city had open canals for drainage, but these are found unsatisfactory. Besides, the possibility of draining the marshes into the Mississippi would not



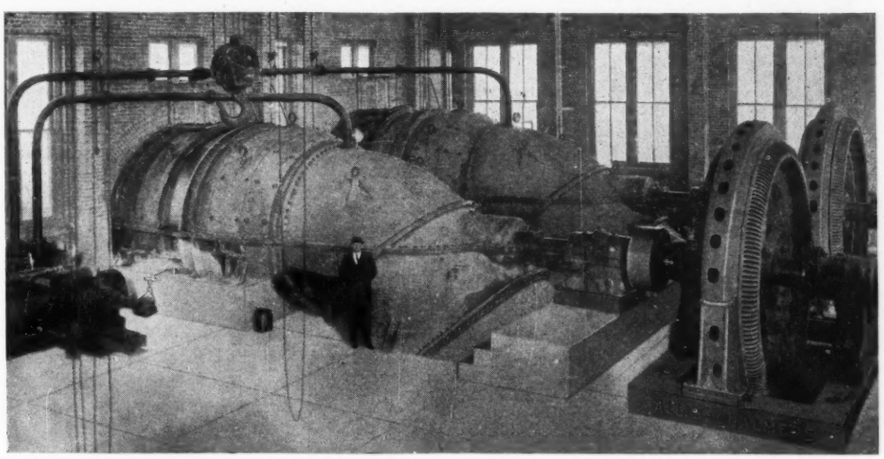
New Orleans' water purification plant and pumping station. It has a capacity of 40,000,000 gallons of filtered water daily. When the filtration plant was built provision was made to accommodate the growth of the city for 50 years to come



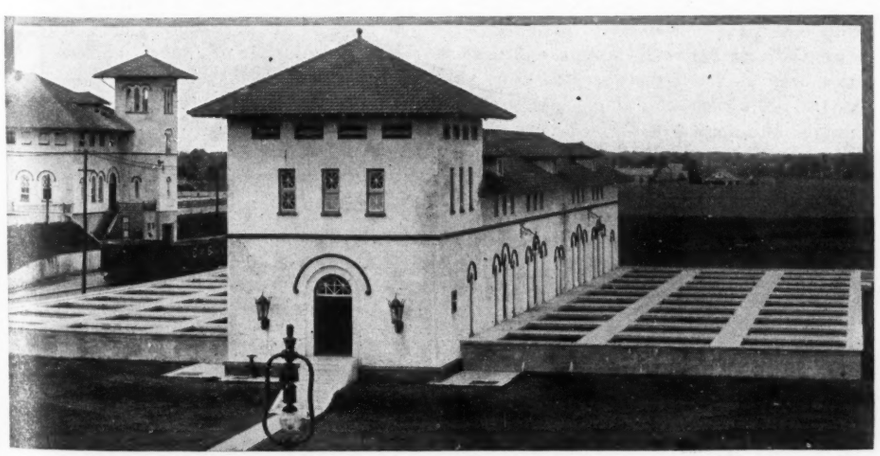
...r outdoor life and enjoyment has been provided by the civic authorities. The park embraces about 75 acres and affords a playground for the ...e finest grove of live oaks to be found anywhere

work because the alluvial silt that washed down the river kept raising the bottom of the stream until it was higher than the city itself. Lake Pontchartrain, to the north, offered the best means of getting rid of the surplus water. Today the levees that control the current of the Mississippi are much higher than the city and often times when the river is at a high stage the muddy current may be seen rushing through the city several feet above the level of the streets.

The original use of open canals for drainage have been responsible for many very attractive streets in New Orleans. When the canals were first made a driveway was built on each side and the banks of the canal planted with trees. Late years the canals have been covered and sodded and now street railway tracks run through this tree-lined neutral zone, as the cover over the canal is termed. The first impression one gets of this form of street engineering is that of a boulevard. Each side of the neutral zone is a driveway nearly as wide as the average street in a residential district and the keep-to-the-right rule is observed. There is no congestion, as these streets are very wide and horse and motor traffic never get on the car tracks on these streets. Canal street, the main business thoroughfare of New Orleans, once had an open canal in the center. This is now closed and instead of being sodded it is paved and five car tracks find room in this zone. There is ample room between the car tracks and the curb on each side to park cars and for traffic to move without congestion.

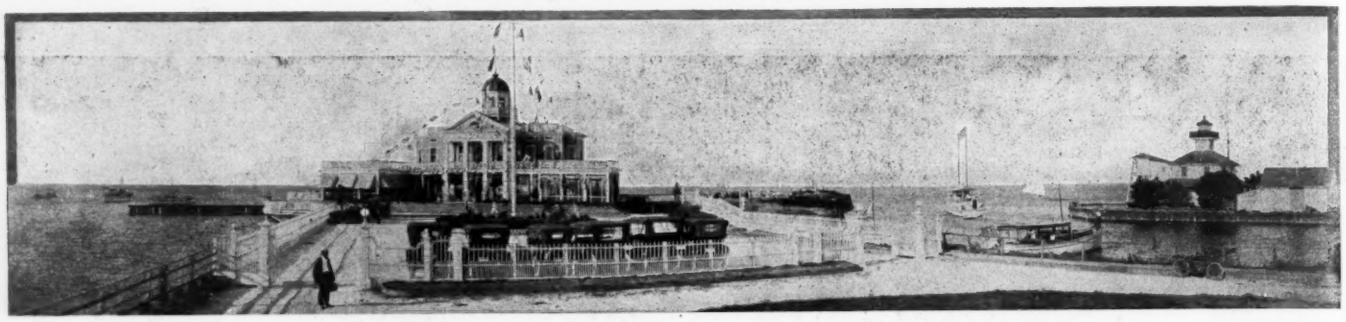


Interior of one of the pumping plants of New Orleans' drainage system showing 12-foot screw pumps with a discharge capacity of 550 cubic feet of water per second, or 356,000,000 gallons of water daily. These pumps remove the rain water that drains into the network of drainage canals underlying the city



The filtration plant and water system of New Orleans is unsurpassed by any American city. The sediment of the river water is removed, leaving it almost chemically pure and free from bacteria. This view shows the filters

It may sound like a paradox to say that there is a 7,000-acre orange grove within the corporate limits of New Orleans, but the Crescent city has a distinction that few, if any, other American cities have. The corporate limits of the city and the corporate limits of Orleans parish, or county, are the same. There is no county government, the city government, which is of the commission form, being the only one.



With the exception of the New York Yacht Club the Southern Yacht Club has a larger membership than any other similar club in America. The club is located in the west end of the city on the shores of Lake Pontchartrain and is only 23 miles from the Gulf. To the west of the club is now being built a combined land and water amusement resort that will rival Coney Island

After the city's water is given a process treatment it is conveyed to reservoirs where the precipitation of sediment takes place from whence it passes through filter beds, thence to covered reservoirs in order that the purified water will not come in contact with dust or air until taken from the faucet in the home

It is well that this is so for the territory lying to the south and east of the city has no commercial value until it is drained and money probably would not be forthcoming to reclaim this land were not the city of New Orleans vitally interested in it. Many acres of this marsh have been drained and now this area forms productive groves of oranges and other produce.

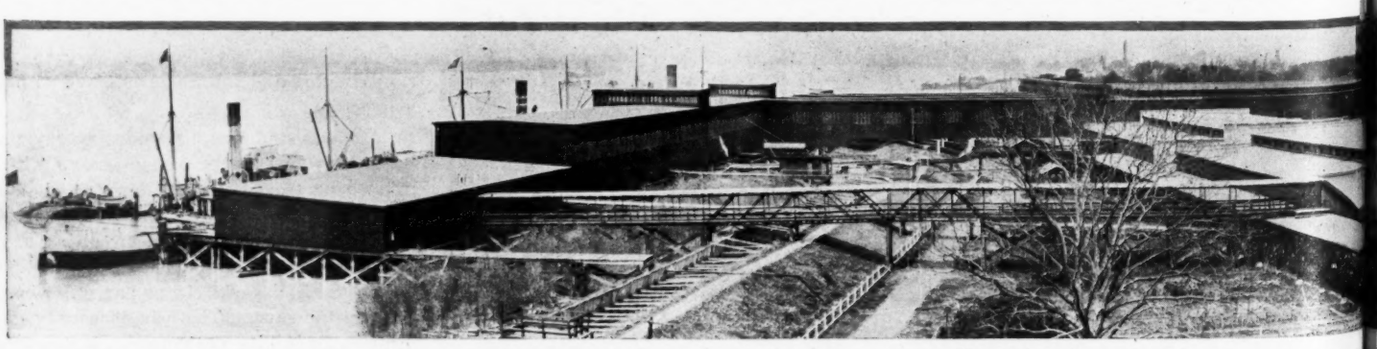
New Orleans knows and feels its isolation so far as motor tourist traffic is concerned. Water and marsh cuts off all vehicular communication with the Gulf coast to the east and the only all-way motor route into New Orleans at present is around the west end of Lake Pontchartrain by way of Baton Rouge. Even this road is none too good at times. A few influential men that most of the others called dreamers evolved a plan of building a road to the east across the marsh and channels connecting Lake Pontchartrain with the Gulf. None thought this possible, but it is now under way and will be completed next summer. This will be told of in a separate story in a later issue. One can ferry Lake Pontchartrain from Mandeville on the north shore of the lake and get their car into New Orleans for a fee of $5 a car and 75 cents per person riding in the car. This is a quicker way than driving around by Baton Rouge.

As a fitting and vivid background to the old part of the city, the modern or twentieth century side is representative of the best in the latest architectural skill and building construction. Most of the public buildings are located between the old French Quarter and the residential section, or garden district. Grouped along Canal street, the main artery of travel, whose unusual width is noted the world over, are the office buildings and the department stores, the Maison Blanche, or White House, being one of the most modern department stores to be found in the South. Libraries and memorial buildings are many and imposing. The city has many attractive parks occupying a city block, which greatly adds to the artistic layout of a city beautiful. City Park, its largest playground, is an exemplification of the beauties of nature. Great live oaks, one of the finest groves of these to be found anywhere, are everywhere in City Park. Festooned with Spanish moss, they present a very attractive appearance.

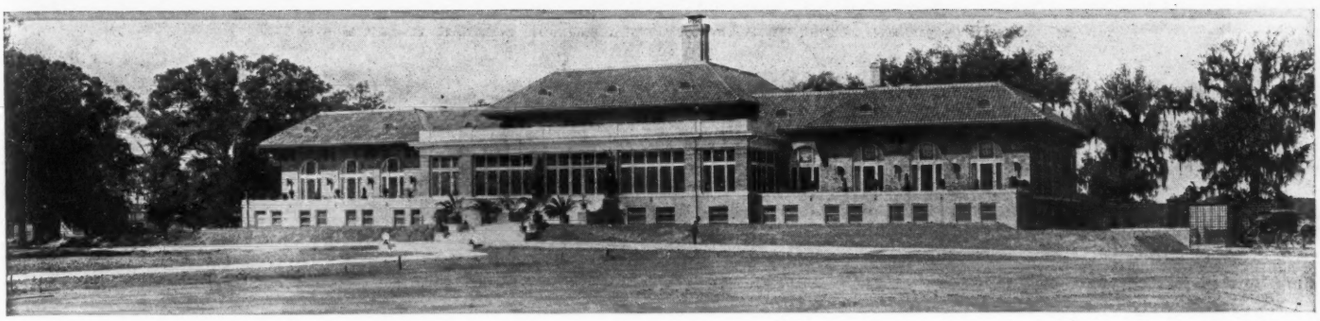
Audubon Park is to the residents of the American section what City Park is to the French Quarter. The park covers 247 acres and was originally the plantation of the French patriot, Masan, who was condemned to imprisonment in Morro Castle for resisting the cession of the colony to Spain.

The Confederate Memorial contains a wealth of historical relics relating to the conflict between the North and South. The effects of Jeff Davis, president of the Confederacy, are on exhibition here.

Perhaps the most picturesque shrine of New Orleans is St. Roch's chapel. This was built in 1871 by Father Thevis, with his own hands, in fulfillment of a vow that if none of his parishioners should die during the epidemic of 1866-67 he would build a chapel in thanksgiving to God. Stone by stone the old priest built the chapel on the site that he called "Campo Santo,"



The American sugar industry found its birth on the fertile alluvial soils of Louisiana where the growing of sugar cane has been the leading in... refineries in the world, the daily capacity of which is 12,000 barrels.



This is the New Orleans Country Club located in the uptown residential section of the city and accessible by a series of beautiful motor roads. Its membership embraces all ages of society

meaning holy field. Soon pilgrims from all parts of the city sought out the chapel and it became a favorite shrine for the suffering and afflicted. In time it acquired the prestige of the miracle-working shrines of Europe.

The shrine is surmounted by a statue of St. Roch, and at the side is the good dog which fed him miraculously when he lay afflicted with the plague and abandoned in the forests near Bingen many centuries ago. The chapel is designed in the fashion of the mortuary chapels still extant in German and Hungarian countries. Each morning the bell hanging in the quaint belfry is tolled in accordance with the Hungarian custom, and every Monday morning mass is offered in the chapel for the repose of the souls of all those interred within the consecrated grounds. As the German catholics had no cemetery of their own, Father Thevis converted the ground around the chapel into a burial spot for them.

A Tradition of Hymen

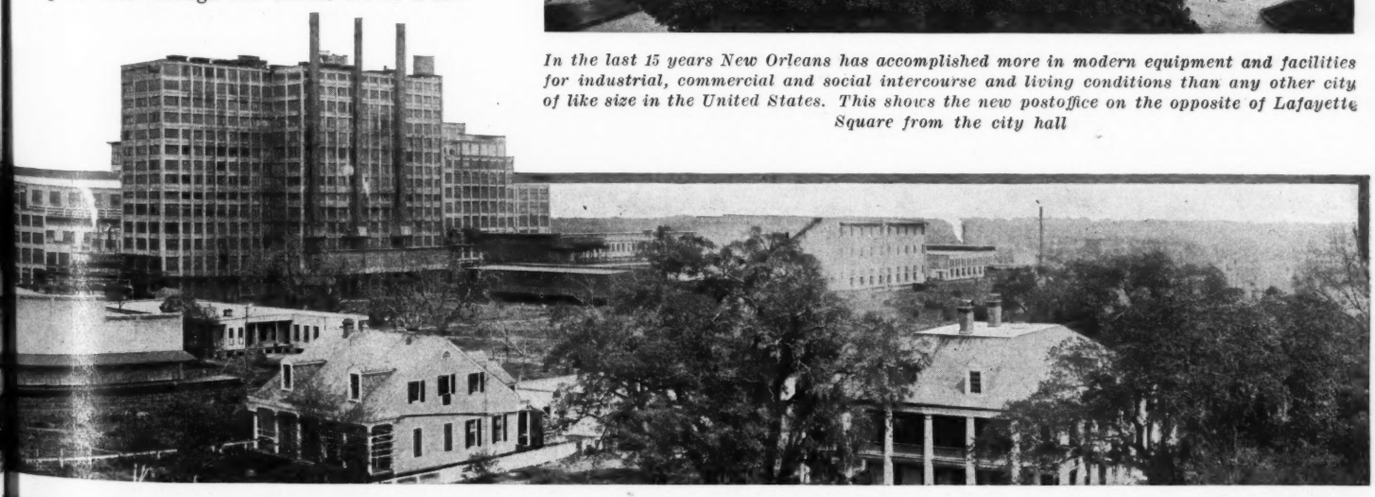
There is a tradition that the young girls of the city pray for husbands at St. Roch's. The devout young girl who wishes to marry well will perform a novena in the orthodox manner—that is, for 9 days in succession she will walk barefooted from her home to the shrine, bearing a lighted taper. There she will make her prayer to St. Joseph, the patron saint of marriage. However, a fleeting glimpse of pink toes through the tiniest bit of a slit might be almost as effective as bare feet.

The traditions of Old Spanish Fort embrace the whole history of the foundation and settlement of New Orleans. Beginning with the landing of Bienville at the mouth of the bayou, which he named St. Jean, and his resting with his wearied followers on the high ground on which the remnant of the fort now stands, preparatory to his ascent of the bayou in pursuit of the shortest line between Lake Pontchartrain and the Mississippi river, and tracing down through the century and a half which have passed, the most vivid and interesting incidents of that history are to be found around this old fort.

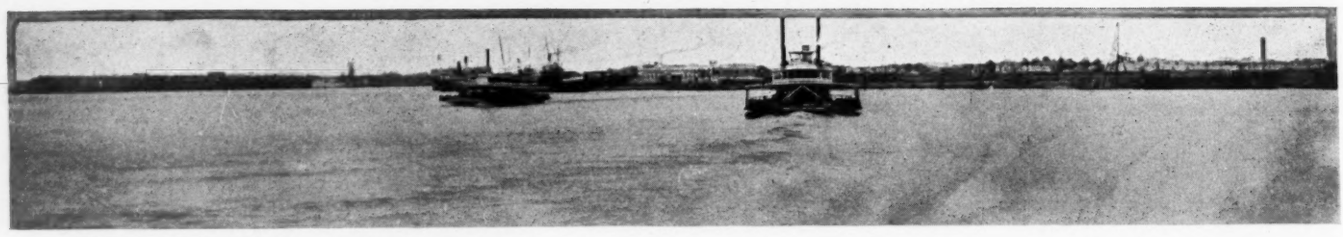
During the Spanish dominion the fort was kept in good condition and was well fortified. It was regarded as the principal protection of the city against sudden assault by Indians or pirates, who then abounded in the Gulf. Thus the old fort was always garrisoned and held ready to defend the only practicable approach to the city at that time.

After both Spanish and French dominions ceased, Andrew Jackson and his staff found the fort with its ancient guns in position and used it to repel an invader far more formidable than Indians and freebooters of the Spanish main. The British cruisers were then engaged in a close

In the last 15 years New Orleans has accomplished more in modern equipment and facilities for industrial, commercial and social intercourse and living conditions than any other city of like size in the United States. This shows the new postoffice on the opposite of Lafayette Square from the city hall



150 years. The development of the sugar industry has reached the pinnacle of success through the possession of one of the largest sugar the American Sugar Refinery close to New Orleans



Mississippi river scene at the foot of Canal street with two ferries in action. The river here runs due north. There are no bridges across the Mississippi at New Orleans and the river here is very wide, swift and from 80 to 100 feet deep

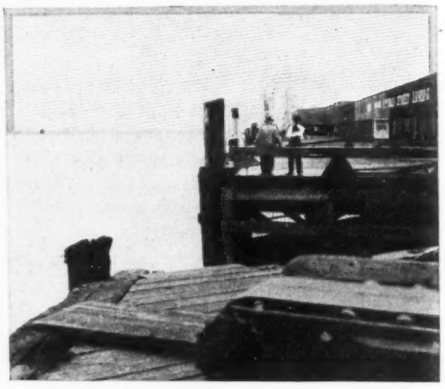
survey of all the approaches to the city, preparatory to the great expedition which had been long contemplated against it and which subsequently met with so disastrous conclusion. Today the old Spanish Fort is maintained by the New Orleans Railway and Light Co., as a pleasure resort.

A few miles below the city, reached easily by motor, is the scene of the Battle of New Orleans, where on January 8, 1815, General Jackson, with mixed troops composed of 2,131 men, met and defeated the British army of invasion, led by General Pakenham and composed of 14,450 armed men. The ruins of the house at which General Pakenham made his headquarters are picturesque and interesting.

The patriotic spirit and loyalty of the New Orleans people finds the history of the country recorded in its monuments, though in the present day the people have turned their attention to building monuments associated with its industrial and commercial activities rather than statues of stone and bronze that marked military conquest under the leadership of generals, which was the custom of 50 years ago. However, the monuments erected in the old era are classic examples of the sculptor's art. Today the citizens of the city are building permanent monuments such as a $3,500,000 cotton warehouse, a municipally-owned grain elevator, the finest dock system in the world, a public belt railroad and other economic facilities that directly and indirectly are a material benefit to every citizen.

Second American Seaport

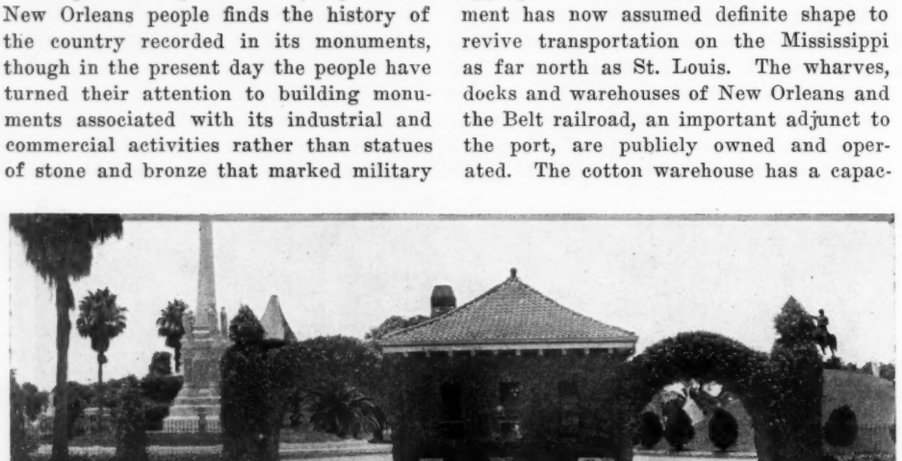
New Orleans, under normal conditions, ranks as the second greatest port in the United States. During 1915 exports and imports through the port of New Orleans aggregated over $300,000,000. A movement has now assumed definite shape to revive transportation on the Mississippi as far north as St. Louis. The wharves, docks and warehouses of New Orleans and the Belt railroad, an important adjunct to the port, are publicly owned and operated. The cotton warehouse has a capacity of 2,000,000 bales and there are miles and miles of overhead trackage in this warehouse for handling the cotton. No visit to New Orleans would be complete without seeing the wharf and the cotton warehouse.



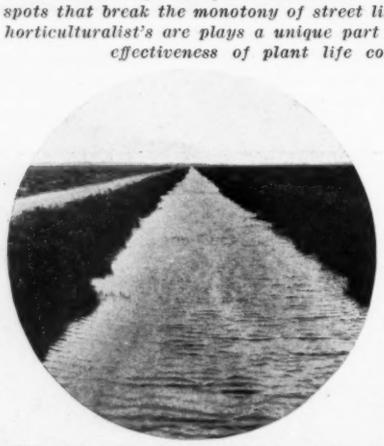
View of the wharf and warehouses, the latter lining the river as far as one can see

Ten years ago New Orleans did not possess a municipal water system. The drinking water of the city was supplied in individual rain water cisterns. Over $30,000,000 was provided about 10 years ago by business men and the civic administration for a modern filtration plant and water system. Unlike other cities the work called for entirely new construction throughout as up to this time the city possessed only two water mains and five plugs, or hose connections. Mains have been laid throughout the city and the plans were drawn to fit any increase of population for the next 50 years.

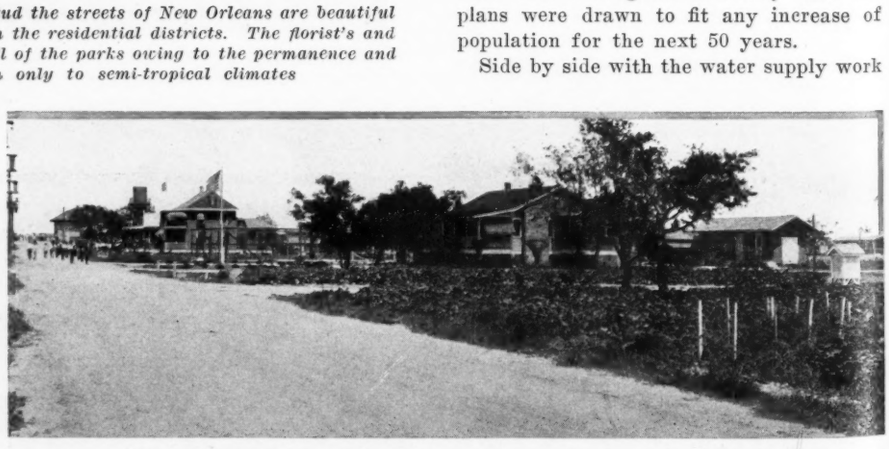
Side by side with the water supply work



The monuments, small parks and circles that stud the streets of New Orleans are beautiful spots that break the monotony of street lines in the residential districts. The florist's and horticulturalist's are plays a unique part in all of the parks owing to the permanence and effectiveness of plant life common only to semi-tropical climates



This shows how the 7,000-acre orange and grapefruit grove in New Orleans is drained. The shell roads of this type form a net work through the groves



Typical shell roads along Lake Pontchartrain and through the orange grove sections. In fact, many such roads are being built out of New Orleans proper, and as oyster shells may be obtained in abundance along the Gulf coast to the east of New Orleans this material is the logical surfacing to use. Besides they make a beautiful road

came much street paving. The streets being opened for the mains provided an opportunity for paving activity and much asphalt and wood block were laid. The building of the water and filtration plant—the water comes from the Mississippi river—called for modern sewerage systems and this made necessary a better drainage system. Under the new era of municipal improvement and development in the last decade practically all of the open canals have been arched over and replaced by parkways in the center of the streets that are being ornamented with tropical shrubbery. By lowering the ground water level New Orleans' drainage system has actually reduced the humidity of the atmosphere.

I previously mentioned that within the corporate limits of New Orleans is a 7,000-acre orange grove. This is the largest grove in the world, and is all on reclaimed ground. The grove is owned by northern business men. Throughout the grove is 72 miles of shell road.

There are 9,000,000 acres of marsh land in Louisiana and all of this vast area is far richer in the elements of plant life than the best soils in the valley of the Nile. Five crops are possible each year and it seems likely that within the next 15 or 20 years much of this land will be reclaimed, now that the method has been shown productive of good results.

Club life is a prominent factor in New Orleans and various clubs are in existence that conform to every taste, age and condition of society. Few men and women of prominence or position are not members of several of the leading clubs. The Southern Yacht Club, the Audubon Golf Club and the Country Club are the principal organizations directly interested in outdoor year around sports.

New Orleans is surely without a rival as a playground. Everyone who likes the out of doors can count more sunshine and balmy air out of 365 days than any where else. Lakes Pontchartrain, Maurepas and Borgne and the many bayous and canals invite the lovers of water. Fishing and hunting may be found in abundance so taken all in all, one can find plenty of diversion in and around the Crescent city.

New Orleans is famous for its chefs. Within a stone's throw of its sumptuously appointed hotels, noted for their cuisines, may be found little old restaurants that seem to have been lifted bodily out of the nooks and corners of the Old World. Here the Creole dishes vie for favor with the concoctions of Marseilles, of Genoa and of Barcelona. Here is said to be the best coffee in the world—French drip—but you have to learn to like it. I didn't. Here the master chefs of the Old World have foregathered because New Orleans is a city that warms the cockles of their hearts like the home port over seas.

One thing that will interest the visitor in New Orleans is its cemeteries. Perhaps it may sound peculiar to say that cemeteriest will interest anyone, but New Orleans' cemeteries are different. Previous to the last few years when water was practically on the surface of the ground all over the city, all burials were in stone vaults set on top of the ground. Now the many Cities of the Dead to be found here present a strange appearance. Rows and rows of stone sepulchres are seen in all of the old burial grounds with an occasional mausoleum rising above them.

Gambling, lotteries, dueling and racing were at one time popular diversions in New Orleans. Now only the latter may be said to flourish to any extent.

Much has been said and much more has been written about New Orleans, but to know the quaint old city which has withstood the wars and the buffetings of fortune, one must see it. One must see the architecture that characterizes the old buildings of New Orleans—the wonderful work of Spanish, French, Italian, British and American designers. One must stand within the ancient Cabildo, where was written so much of Louisiana history and where Louisiana was transferred from France to the United States; one must stand beneath the tall spires of the Saint Louis Cathedral, where centered the social and religious life of the land that was an empire in itself and of the city whose history has been written in blood; one must wander through the old and deserted corridors and patios and courts and through the French Quarter—one must see those things and feel the things that those places are redolent of to know New Orleans. He must visit the cafes and lounging places, the old cathedral, the balls and the opera, to breathe the atmosphere that gives to the city its individuality and to understand the spirit of those who are truly a part of it all.

The Spaniard, the Frenchman, the Mexican, the Cuban and the Central American all inherently understand this spirit because it is a part of them. The North American soon will note in New Orleans a difference—a new atmosphere in which business sometimes pauses for pleasure, and he will like it.

Answers to Inquiries for Road Information

Oshkosh, Wis.—San Francisco, Cal.

OSHKOSH, Wis.—Editor Motor Age—Kindly give the best routing from Oshkosh, Wis., to Los Angeles and San Francisco. We expect to leave the latter part of October. Would oMtor Age advise going via the Lincoln Highway?—Faust Automobile Co.

From Oshkosh drive south via Fond du Lac, Oconomowoc, Eagle, Elkhorn, Lake Geneva, Harvard, Rockford, Dixon, Sterling, Unionville, Clinton, Davenport, Washington, Fairfield, Ottumwa, Chillicothe, Plymouth, Excelsior Springs, Pratherville, Belleview, Kansas City, Emporia, Florence, Newton, Hutchinson, Syracuse, La Junta, then down via Trinidad, and Raton to Santa Fe.

From Santa Fe your route lies through Springerville, and from there you have the choice of two routes, one going through Phoenix to Los Angeles, and the other going via the Grand Canyon to Los Angeles. The northern route through the Grand Canyon has the big attraction of one of the wonders of the United States, while the southern route through Phoenix has slightly better road conditions. From Los Angeles drive north along the coast to San Francisco.

Superior, Wis.—Florida

Superior, Wis.—Editor Motor Age—Kindly give the best route from Superior, Wis., to New Orleans and Florida.

Will I have any trouble with a 56-inch tread in the South?—Fred Wilson.

From Superior drive to Duluth, then via Atkinson, Sandstone, Hinkley, St. Paul, Farmington, Northfield, Dundas, Medford, Owatonna, Lansing, Lyle, Minn., St. Ansgar, Ia., Osage, Orchard, Plainfield, Janesville, Waterloo, Laporte City, Newhall, Cedar Rapids, Iowa City, Riverside, Mt. Pleasant, Charleston, Keokuk, Hamilton, Ursa, Quincy, Hannibal, Mo., New London, Frankford, Louisiana, Flint, Wentzville, St. Charles, St. Louis, Mo., E. St. Louis, Ill., Belleville, Lenzburg, Tilden, Pinckneyville, Murphysboro, Makanda, Mill Creek, Cairo, Ill., Wickliffe, Ky., Arlington, Clinton, Moscow, Jordan, Ky., Union City, Tenn., Obion, Dyersburg, Maury City, Brownsville, Gallaway, Arlington, Raleigh, Memphis, Lynchburg, Miss., Robinsonville, Hollywood, Dundee, Coahoma, Sumner, Schlater, Greenwood, Lexington, Goodman, Jackson, Miss., Gallman, Beauregard, Brookhaven, Summit, McComb, Greensburg, Baywood, Baton Rouge, Darrow, St. Charles, New Orleans, La.

Between New Orleans and Jacksonville we advise that you route via Mandeville, Slidell, La., Logtown, Miss., De Lisle, Pass Christian, Mississippi City, Biloxi, Ocean Springs, Orange Grove, Miss., Mobile, Ala., Fairhope, Silverhill, Lillian, Ala., Millview, Fla., Pensacola, Floridatown, Milton, Holt, De Funiak Springs, Westville, Lindsay, Greenwood, Bascom, Fla., Conalsonville, Ga., Bainbridge, Whigham, Cairo, Thomasville, Ga., Monticello, Fla., Greenville, Ellaville, Live Oak, Lake City, Saunderson, Jacksonville, Fla.

Crete, Neb.—Deming, N. M.

Crete, Neb.—Editor Motor Age—I would be pleased to have the most direct route between Crete, Neb., and Deming, N. M. I expect to leave about December 1st.—C. M. Algermissen.

In going to Deming, N. M., Motor Age would advise the following routing: From Crete, drive via Sheslak, Wilber, Dervitt and Hoag, to Beatrice. Then from here drive via Blue Springs, Oketo, to Marysville, and west through Hanover, Washington, Cuba, Belleville, Concordia, Kan., and Fowler.

Leaving Fowler drive southwest via Liberal, Kans., Texhoma, Okla., Stratford, Tex., Dumas, Amarillo, then via Plainview, Hale Center, Brownfield, Plains, Roswell, N. M., Hondo, Alamogordo, El Paso, and via Lanark, N. M., to Deming, N. M.

Cincinnati, O.—Jacksonville, Fla.

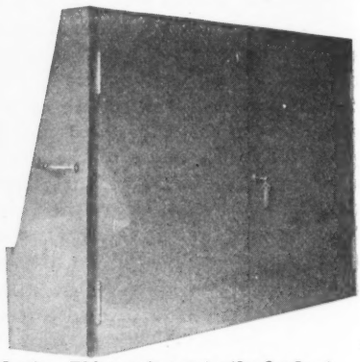
Wellington, O.—Editor Motor Age—Kindly give the best route from Cincinnati, O., to Jacksonville, Fla.—L. A. Baumgardner.

In going to Jacksonville, Fla., from Cincinnati, O., we advise that you go via Cleves, O., Aurora, Ind., Oberdeen, Vevay, Ind., Carrollton, Ky., Shelbyville, St. Mathews, Louisville, West Point, Elizabethtown, Horse Cave, Cave City, Mammoth Cave, Bowling Green, Russellville, Adairville, Ky., Springfield, Tenn., Nashville, Murfreesboro, Fayetteville, Tenn., Huntsville, Ala., Larkinsville, Chattanooga, Tenn., Rossville, Ga., Dalton, Adairsville, Marietta, Atlanta, Jonesboro, Hampton, Barnesville, Macon, Hawkinsville, Douglas, Waresboro, Waycross, then via Uptonville, Folkston, Ga., Andrews, Fla., Callahan to Jacksonville, Fla.

From the Woman's Viewpoint

Three-in-One

This Home-Made Cabinet Concentrates Pantry, Kitchen and Dining-Room Under the Motor Car's Robe Rail



At the right is the cabinet exterior. Note the inclined back. This conforms to the back of the front seats. Opened, the cabinet seems an ordinary cabinet

HOW would you like to be able to concentrate your pantry, kitchen and dining-room under your robe rail so that the front of the concentration would be perpendicular to the rail? This is what Mrs. A. T. Knapp, Mulford, Mass., tells Motor Age she has done. And, furthermore, she proves it by sending photographs and describing in detail the arrangement.

Mr. and Mrs. Knapp make two trips each year to Ohio. In addition, they have motored in many states in the Union and have been in Canada several times. They have, therefore, given much thought to the comforts of travel. They find, however, that the cabinet is the most convenient of all and, being fitted with a Yale lock, renders safe its contents no matter where they leave the car.

This Cabinet Makes Eating Easier

In answer to an editorial in Motor Age issue of September 30 Mrs. Knapp writes of this method of carrying lunch and thermos bottles. Like other motorists, she, too, has found that it is hard to carry them safely without special arrangement. Besides, the cabinet Mr. Knapp built makes eating easier. It is almost as impossible to eat lunch out of some of the motor trunks or baskets as it is to hold the hot coffee in one hand and eat with the other, say these two motorists. If the coffee is as hot as in their thermos bottles, they say, you cannot hold it very long and there is no place to set it down. But with a table steady—here's where the cabinet unfolds—you have all the room you wish and can enjoy as good a meal as any restaurant can serve you, or you can have just a simple lunch, whichever you prefer.

Now for the cabinet. In the first place, it was a special job. It was built to fit under the robe rail of a Willys-Knight, and a robe rail of a Willys-Knight stands 4 inches from the back of the front seats. However, the back slants and gives a space of 11 inches at the bottom, so the cabinet was made to graduate up to the 4 inches at the top. It is 27 inches wide, 21 inches high, and a robe can be hung over the rail, thus concealing it entirely if wished.

The cabinet need not be concealed for lack of looks, however. It is made of half-inch white wood, except the back, which is of galvanized steel to bend to the shape of the back of the front seats. Black enamel is used on the outside, and white enamel on the inside. Handles, hinges and locks are nickel plated.

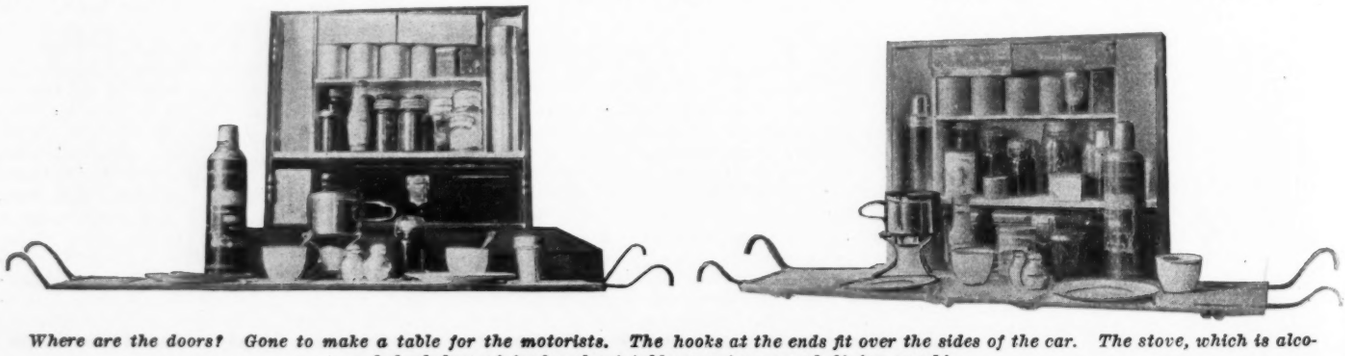
The hinges are loose bolt hinges. The doors come off and hinge together lengthways. Two sheets of white enameled steel form the eating surface of the table thus formed. Bent hooks of strap iron are placed at the ends of the doors and fit over the upholstery. The table is 14 by 42 inches, and with the cabinet in front of you, you can sit on the back seat of the tonneau to cook, serve and eat.

One end of the cabinet contains a food jar for hot soup, salad or ice cream; the other end, a Thermos bottle for hot coffee, chocolate or cold drinks. Space for canned goods lies behind them. On the bottom shelf a large black enameled lunch box, 9 by 20 and 7 inches deep, can contain as much as two whole pies, a layer cake, a dozen doughnuts, a loaf of gingerbread, 1 pound of cheese, large loaf of bread and a 4-pound roast. The cover of this box hinges in the middle, so you have only to pull the box half way out to get at all the contents.

Tool Box Now Used for Lunch

The lunch box was originally a tool box for Fords, but now makes a satisfactory lunch box. Behind the box, extras, such as extra salt, pepper, paper napkins and so forth, find room. Besides the box is space for a 2-pound box of domino sugar, a can of beans and a solid alcohol stove. The four white enameled steel plates carried by Mrs. Knapp were used between the pies in the box to protect them.

The second shelf of the cabinet is high enough for a quart jar. Here the Knapps carried all kinds of food. One list includes three cans of soup, one of olives, a pint of pickles, one can of kidney beans, spaghetti, a can of cocoa, a can of ground coffee, a can of tea, several 5-cent cans of evaporated milk, several cans of solid alcohol, about three different kinds of home-made preserves, jelly, glass jar of dried beef, another of bacon, a bottle of salad



Where are the doors? Gone to make a table for the motorists. The hooks at the ends fit over the sides of the car. The stove, which is alcohol, shelves of food and set table promise a meal fit for any king

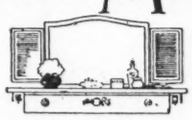
dressing, a bottle of vinegar, another of brandy, a set of collapsible drinking cups and two large white enameled ones.

On the top shelf went a Thermos butter jar, three jars for dry groceries, two cans of sardines, a box of matches, a cake of soap, towels, a box of silverware, Uneedas and Oysterettes. As many as seventy-five articles have been carried in the cabinet, and complete dinners, from soup to dessert, have been served from it.

In case of rain, owners of such a cabinet need not get out of the car even, but put on the side curtains, open up the cabinet, set the table, light up the alcohol stove and cook dinner. Afterward the Knapps used to write letters on the table or read until the rain was over or they wanted to go on. From five to seven persons have been served at a time from this cabinet. It can be taken out of the car, set on the grass and the doors placed side to side to form a square table if so desired.

Such an arrangement would be particularly good on a transcontinental tour, especially if traveling through the American deserts. The preparedness it offers would mean independence of schedule in regard to hotels and restaurants, as well as the added comfort of traveling.

Beauty Hints for the Woman Motorist



No. 14

SOME women are annoyed by a tendency of their lips to chap when they a motoring go. The shortest trip seems to affect them in this way. Besides the unpleasant smart of the lips, the appearance is by no means improved; yet sometimes the chap comes when very little wind is abroad. Veils do not always prove a cure, though they are safeguards against the wind in general.

Of course, it is wise to use cold cream before motoring. Every woman knows that, but somehow or other the lips are often neglected. Perhaps it is because cold cream is not pleasant on the lips. But a delicate application of cold cream will protect the lips as it does the rest of the face.

Approaching the Car

A WOMAN there was who decided it would be great sport to learn to motivate a motor car. Besides, it was quite the rage. Everybody was doing it, and she by no means intended to be the tail to the kite, even though the tail of a kite is very necessary and it takes all sorts of people to make the world.

For years she had had her annual car, but the equipment of each car had included a chauffeur. Moreover, the first few models had been so stiff and variously unwieldy that a tradition to the effect that she could not run her car had arisen and taken unto itself the strength of other years. So she found it somewhat hard to get accustomed to the idea that just as the later models had grown more flexible and less exacting in operation, so had the tradition grown more hoary and ghostlike.

Her latest model was a gem, and she did not see how she could permit anyone else to run it. The engine was practically noiseless, it seemed no trouble at all to start it, and she knew all you had to do to stop it was to do like she saw everyone else doing. She had not learned much about driving a car all these years: the equipment of her cars had included a chauffeur, but she couldn't help picking up a little information, being of an observing and absorbing mind.

Of course, there was a lot of talk about her learning to drive her car, even before she put her foot on the clutch for the first time. The neighbors wondered if it wouldn't make her too masculine, and all were sure she would break up the machine. Even the family didn't show as much enthusiasm as it should. None of the other women in the family thought they would be able to ride in the car after she began trying to run it, and all the men were sure she would strip the gears or do something else technical like that. Then there were those who felt sure that she would get string halt or something similar if she went to straining and pushing at all those levers and pedals.

But she was determined she had a mind of her own and would exercise it in this respect. It being her car she had the deciding vote, and to learn she started.

Now there are ways and ways of learning to drive a car as she knew, and as many others no doubt know. First, you can get a book of instructions with your car as you do with the fireless cooker, gasoline stove and whatnot. Again, you may hire a chauffeur to teach you when the car isn't being used for anything or anybody else, which isn't very often in a modern, moderate-sized family. Or you may make the dealer who bluffed you into buying a new model instead of splurging in a new house and lot or Steinway, teach you before you are quite sure you like the new contrivances.

Yes, there are ways and ways. Her way was to disconnect the chauffeur who came with the regular equipment and appropriate the chauffeur who was working for one of the family—on the time basis—for her instructor that was to be until knowledge did them part.

The town was a comparatively small town, but had tolerably good streets, as most comparatively small towns do nowadays. But those who knew advised seriously against learning on the crowded streets among the traffic and all that.

For the first lesson they chose an uninhabited piece of road that was uninhabited because it was yet to be improved. Deep wagon ruts disturbed the smooth surface of the bed, and drainage ditches on the sides furnished variety to the landscape.

It was easy starting the engine, very easy; in fact, the man who was to teach her started it himself. And strange to say, he was glad to get back in the car from in front. The instructions were minute. Those little things on the steering wheel—she was not quite sure yet what they were—had been adjusted to the proper angles, and the moment had come. True to precedent, she put the clutch out and threw the gear-lever from neutral into first-speed position, all set to start. But the formula failed her there. The engine snorted with disgust and died as she, so she thought, gently let the clutch in.

But the road was bad, and she could blame it on that, and she did. What could she hurt anyway, if she couldn't start? But the man who was to teach her was very patient, and she began again. This time she let the clutch in very gently indeed, so gently in fact, that the engine and wheels started off amiably together as if the engine had never snorted in disgust or failed to respond to feminine treatment.

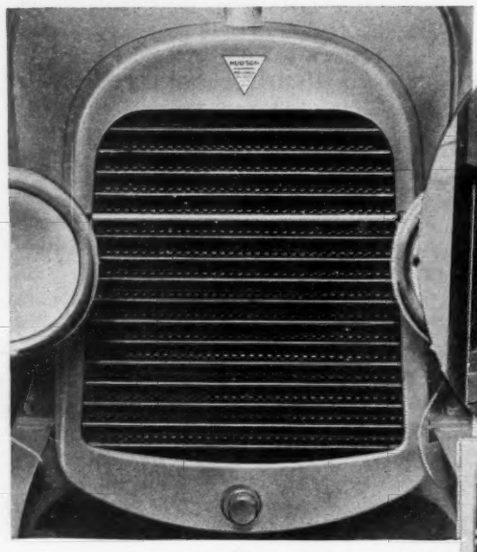
A good beginning makes a bad ending sometimes, but not when it is learning to drive a car. Foot brake, emergency brake, even accelerator were conquered in turn, and, oblivious that the car had anything under its hood that might defy external control or that this make or that make might give a better mileage, she set her mind to running straight lines down the roads and through the streets.

What did she care about oil and gasoline anyway, as long as she wasn't out in a desert with no one around to look after it for her, and then there wouldn't be any use caring?

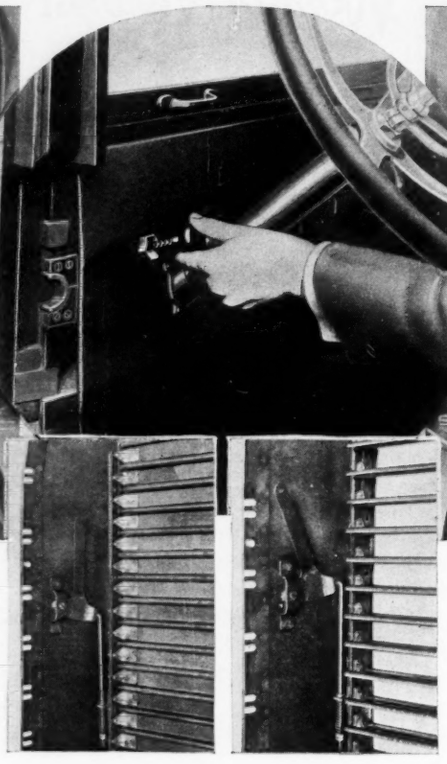
And after she had really learned to run the car so it didn't leave a track like a snake's imprints, all the neighbors and even the family agreed that perhaps after all she could run a car. And then they began to wonder if that wouldn't help everybody.

They all were right. The manufacturer gave more attention to the seat covers than ever before. The entrance and exit for the driver's seat was made more convenient. Starting and lighting arrangements were improved. Gear shifts developed ease. Then everybody said: "My, what an improvement the modern car is over those of 2 or 3 years ago!" And she didn't say anything; she was too busy keeping her appointments, which somehow or other had seemed to have increased wonderfully since she learned to run the car.

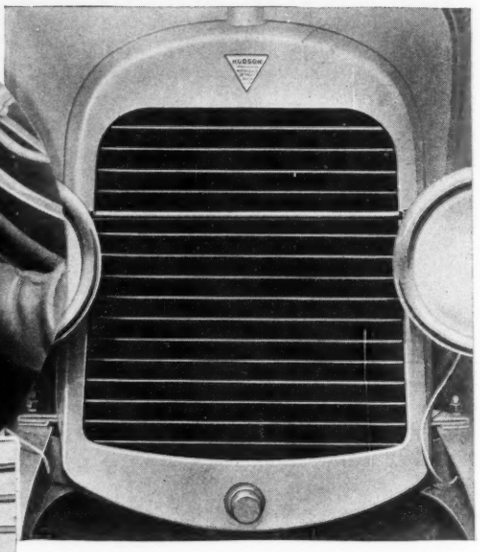
Hudson Adds Radiator Shutter to Control Engine Heat



Hudson radiator with new shutter partly open



Above, dash control of shutter; below, views of shutter from rear—at the left, closed, and at the right, open



Appearance of radiator from front with shutter closed

DETROIT, Mich., Nov. 10—In order to remove the necessity for using padded covers, etc., on the radiators of Hudson cars, the company has just brought out a device which acts as a radiator shutter and which is being listed as special equipment. The new device is operated from the dash by the driver and permits him by means of a simple plunger, to govern the amount of air that comes in contact with the radiating surface and hence puts the temperature of the cooling fluid under his control.

As will be seen from the illustrations, the device acts very much as a shutter with a series of vanes which open and close in accordance with the movement of the controling device on the dash. In summer the mechanism need not be detached, as it does not cut down materially the area of the radiator when it is full open, so that in warm weather it is simply left untouched.

Works with Moto-Meter

In order that the device will be complete, it is necessary for the driver to know the temperature of the cooling water accurately enough to determine whether the shutter is open or closed to the correct degree. This part of the equipment is provided by a Boyce Moto-Meter, mounted in its customary position on the radiator cap.

The device is particularly valuable in warming the car in very cold weather as the air can be entirely shut off from the radiator until the water temperature reaches its efficient degree, which, in the case of the Hudson, is stated to be 130 degrees Fahrenheit. The shutter vanes then can be opened to the desired amount by simply operating the pull rod on the dash.

From a maintenance standpoint, the device is very simple as there is nothing to it except the shutter and the rod and bell-crank operating mechanism. There is no need for any adjustments on it, and none are provided for. The installation is simple and is made possible by using a longer radiator shell which not only houses the radiator but also the shutter. It can be fitted to all Super-Six Hudsons, and the cost of the installation is $25 with Moto-Meter, complete. If the owner has already a Moto-Meter fitted to his car, the shutter assembly can be purchased for $15.

Manufacturers' Communications

EXCESSIVE FREIGHT RATES

STREATOR, Ill.—Editor Motor Age—Your readers are probably all aware of the fact that any supplies shipped over the railroad that are marked "Auto, or Motor Parts," are promptly pounced upon and given the highest freight rate, regardless of what this material may be, as they have felt that the motoring public could best afford to pay excessive rates. A firm may manufacture a great number of articles that are more of a luxury than motor car parts, accessories, etc., and still get cheaper freight rates on these goods. The problem which now confronts every motorist and should be given careful consideration is in the writer's opinion this:

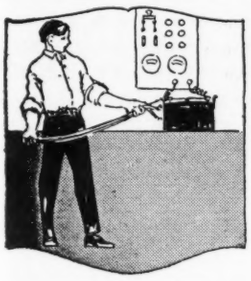
If the United States Supreme Courts decide that Congress has a full and free right to legislate and prescribe wages for any class of people to the exclusion of other classes, the railroad men will receive their increase in wages and the railroads will promptly arrange to succeed in putting through a measure calling for an increase on the freight rates. This will mean an increase of from 3 per cent to 10 per cent on various classes of goods and inasmuch as the rates on motor car supplies are exceedingly high, it will mean that a 10-per cent rate will apply on these parts.

The profit made on tires by the average dealer who has no contract but simply wishes to handle two or three grades of tires, at the present time, is very small. If he maintains this same profit on a casing, we will say, that would cost at the present time, $12, with increased freight rates, 300 miles from the plant, will bring the cost of this tire up to about $13.25.

In making freight shipments, as our concern does, very frequently, to the coast, and we find that on a 7-pound article, the rate approximately, or freight, as from Chicago to San Francisco, is 23 cents, when shipped in 1,000-pound, 2,000-pound and 3,000-pound lots.

As far as the writer can see, the only action left for every man who is engaged in the motor car business is to write a letter to his senator or his congressman and ask him to use his influence, to see that there is no increase in freight rates.

Increased freight rates will simply mean more difficulty in doing business, a closer margin of profit, and a correspondingly greater struggle to keep afloat in the business world. Do the readers who are in business, wish to succeed or fail?—F. L. Angier.



Electrical Equipment of the Motor Car

By David Penn Moreton & Darwin S. Hatch.

Editor's Note—Herewith is presented the twenty-first installment of a weekly series of articles which began in Motor Age issue of June 29, designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the Class Journal Co., Chicago, in a size to fit the pocket conveniently. It is expected that the book will be published about May 1.

WHAT HAS GONE BEFORE

The fundamentals of electrical circuits of the motor car were explained through their analogy to water systems and the relations of current pressure and resistance brought out. This was followed by an explanation of series and multiple circuits, and how electricity is made to do work in lighting, starting, signalling, etc. Calculating the capacity of a battery for starting and lighting and the cost of charging storage batteries and determining the torque a starting motor must develop were explained. Action of primary batteries and dry cells was taken up and the best methods of connections. A separate section was devoted to the makeup and action of lead and Edison storage batteries, and another to the care of lead batteries in service and best methods of charging them. Magnets and electro-magnetism then were considered and the principles of generators and motors explained. A section on generator output was followed by one on the purpose and operation of the cutout.

Part XXI—Electromagnetic Regulation

INSERTING Resistance in Field Circuit Intermittently by Means of a Magnetic Vibrator: The principal of this type of regulation can best be understood by referring to Fig. 145, which shows in a diagrammatic form the electrical connections of the generator, battery and regulator. The regulator consists of an electromagnet with a winding, M, of wire large enough to carry all the current delivered by the generator and connected directly in series with the generator and battery. An armature, A, is mounted near one end of the eletromagnet and normally held away from the core of the electromagnet by means of a spring, S. When the armature moves toward the core of the electromagnet a contact is broken at C. The generator is of the shunt type with one terminal of the field winding connected to one terminal of the machine and the other terminal connected to the remaining terminal of the machine with the contact, C, on the regulator in series. A resistance, R, is connected across the terminals of the contact C and when this contact is opened, due to the action of the electromagnet, the resistance R is in series with the shunt field winding.

The actual operation of the regulator is as follows: As the generator speeds up the electrical pressure between its terminals increases, and when it has reached a value ample to charge the battery the cutout will connect the generator and battery together and the battery will start to charge. With a further increase in the electrical pressure between the terminals of the generator, the current delivered to the battery will increase, and unless some means be provided for limiting the value of the pressure of the generator this current will become excessively high and do damage to both the generator and battery. As the current in the winding of the electromagnet increases in value, there is an increase in the magnetic attraction the core of the electromagnet has upon the armature, and when this attraction is sufficient to overcome the action of the spring S the armature will move and break the contact C and introduce the resistance R in series with the field winding. When the resistance R becomes a part of the shunt field circuit, the current in the field winding is reduced in value, which causes a reduction in the strength of the magnetic field in which the armature is revolving and, hence, a reduction in the electrical pressure generated in the armature winding.

This reduction in electrical pressure results in the value of the current supplied to the battery, which passes through the winding M, decreasing in value, and the magnetic pull of the core of the electromagnet is no longer sufficient to overcome the pull of the spring S, so the armature moves away from the core and the contact C is closed. The closing of the contact C short-circuits

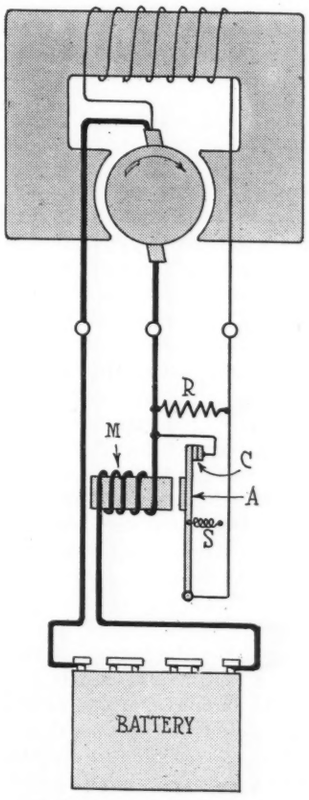


Fig. 145—Connections of electromagnetic regulator to maintain constant current. The winding M is of large wire and is connected in series with the generator and battery

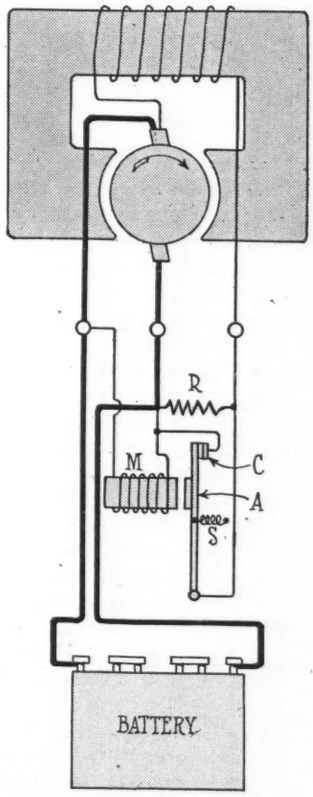


Fig. 146—Connections of electromagnetic regulator to maintain constant voltage. The winding M has more turns and is connected directly to the terminals of the generator

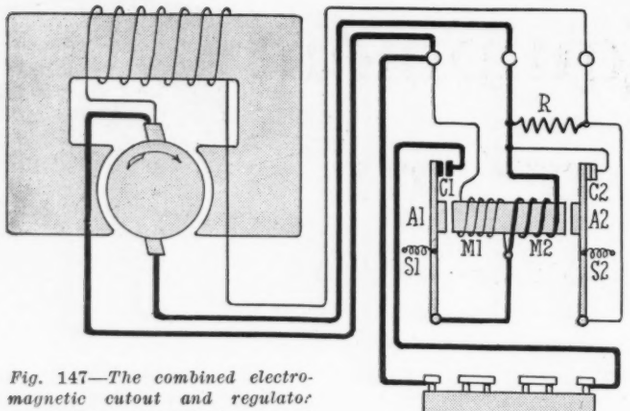


Fig. 147—The combined electromagnetic cutout and regulator maintains a constant current when the connections are as shown here

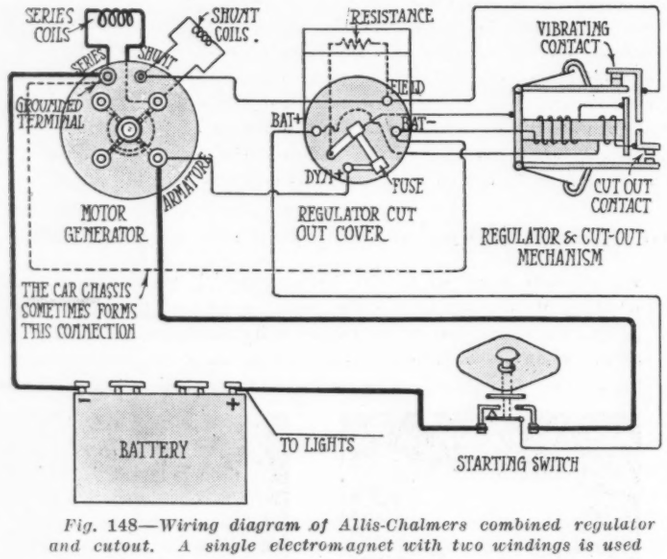


Fig. 148—Wiring diagram of Allis-Chalmers combined regulator and cutout. A single electromagnet with two windings is used

the resistance R, and the field current starts to build up. At the same time the magnetic field in which the armature is revolving increases, which results in an increase in the generated electrical pressure in the armature and, hence, an increase in the current in the winding M. The armature A again is drawn over toward the core of the electromagnet, breaking the contact C and reintroducing the resistance R in the field circuit. This operation is repeated over and over hundreds of times a minute, and the current delivered by the generator, which passes through the winding M, is maintained practically constant at a value depending upon the adjustment of the spring S and the length of the air gap between the armature and the end of the core of the electromagnet. The stronger the spring S and the larger the air gap, the greater the value of the current in the winding M must be in order that the armature be drawn toward the core of the electromagnet and the contact C broken. Likewise, the weaker the spring S and the shorter the air gap, the less current required in the winding M to repeat the above operation.

A slight variation in the winding of the electromagnet and its connections may be made as shown in Fig. 146, when it is desired to maintain a constant voltage at the terminals of the generator rather than a constant current, independent of the speed of the generator armature. The only difference is that the winding M of the electromagnet is composed of a relatively large number of turns of much smaller wire and this winding is connected directly to the terminals of the generator rather than in series with the generator and battery as in Fig. 145. The current in the winding M will increase and decrease with generator voltage, and when the voltage is high enough to produce sufficient current in the winding so that the magnetic pull on the armature A will overcome the action of the spring S, the contact C will be broken and the resistance R introduced in series with the field winding. The action of the resistance R is exactly the same as in Fig. 145, and when the electrical pressure has decreased to such a value that the current it is capable of producing in the winding M does not produce sufficient magnetic pull on the armature to overcome the action of the spring S, the armature will move away from the core and the contact C will be closed, thus short-circuiting the resistance R.

The voltage of the generator builds up again until the magnetic pull due to the current in M overcomes the action of the spring S, etc. This operation is repeated hundreds of times each minute, and the voltage of the generator remains practically constant. The value of the voltage the generator will maintain will depend upon the length of the air gap between the armature and the core of the electromagnet and also the tension on the spring S. The greater the length of the air gap and the stronger the tension in the spring the greater the value of the voltage the generator will maintain, as a larger current will be required in the winding M to attract the armature and this larger current will be produced only when the voltage increases, as the resistance of the winding is practically constant. Likewise, a decrease in the length of the air gap and the weaker the spring, the lower the value of the voltage the generator will maintain.

This principle of operation has been used by the Delco, Gray & Davis, North East, Ward Leonard, Remy, Simms-Huff and Allis-Chalmers.

Systems having electromagnetic types of regulators nearly always have an electromagnetic cutout. The two are usually combined in one housing, or containing case, and the combination is spoken of as a controller. In some cases a single electromagnet with two windings will be used, while in some cases two electromagnets will be used, one for the regulator and one for the cutout. The connection of a controller with a single electromagnet is shown diagrammatically in Fig. 147. The electromagnet is so arranged that the left-hand armature A_1 will be attracted when the current in the winding M_1 produces sufficient magnetic pull on the armatures to overcome the action of the spring S_1. When the armature A_1 is drawn over toward the core of the electromagnet, the contact C_1 is closed and the generator and battery are connected in series, and the generator starts to charge the battery, the current passing through the winding M_2 on the electro-magnet. As the current in the winding M_2 increases, due to any cause, there will be an increase in magnetic pull on the armature A_2, and when this pull is sufficient to overcome the action of the spring S_2 the armature A_2 will be drawn over to the left and the contact C_2 broken. The resistance R causes the current in the field winding to decrease, and, hence, there is a decrease in generated voltage and also a decrease in the value of the current in winding M_2.

When the magnetic action of the currents in windings M_1 and M_2 have decreased to such an extent that the armature A_2 is drawn away by the action of the spring S_2, the resistance R is short-circuited and the voltage starts to build up again, thus increasing the current in the windings. When the voltage decreases below that required to charge the battery, assuming the adjustment of the spring S_1 and the length of the air gap between the armature A_1 and the core of the electromagnet are correct, the magnetic pull due to the current in the winding M_1 is no longer sufficient to overcome the action of the spring S_1 and the contact C_1 is broken, and the generator and battery are no longer connected in series. The magnetic pull required to overcome the action of the spring S_1 is less than that required to overcome the action of the spring S_2, which accounts for the armature A_1 being drawn over before the armature A_2. When the generator is charging the battery, the currents in the windings M_1 and M_2 pass around the core of the electromagnet in the same direction, but if the battery should start to discharge into the generator for any reason the magnetic action of the current in the winding M_2 will oppose the magnetic action in M_1 and the armature A_1 will move away from the core, breaking the contact C_1.

The wiring diagram of the combined regulator and cutout of the Allis-Chalmers Co. is shown in Fig. 148. In this case a single electromagnet with two windings is used. One of these windings, the shunt, serves the purpose of a cutout, while the other, the series, regulates the value of the charging current. When the generator voltage is sufficient to charge the battery, the magnetic action of the current in the shunt winding attracts the armature carrying the cutout contact and the battery starts to charge, the current in the series coil assisting the current in the shunt coil in holding the armature in place. If the charging current increases, due to any cause such as an increase in the speed of the generator, the magnetic pull on the second armature will increase and at some particular value of charging current the second armature will start to vibrate. The vibration of the second armature will cut in and out a resistance in the field of the generator, which will cause a reduction in the charging current by lowering the voltage of the generator.

Inserting Resistance in Field Circuit Intermittently By Means of a Magnetic Vibrator in Combination With a Load Control: The wiring diagram of the Remy controller shown in Fig. 149 illustrates the use of a magnetic vibrator that is influenced by the lamp load in such a manner that the output of the generator is automatically increased whenever the lamps are lighted and the engine is running at a speed high enough to charge the battery. The cutout has a series winding M_1 and a shunt winding M_2. As the voltage of the machine builds up, the current in the winding M_2 increases until there is sufficient magnetic pull on the armature A_1 to draw it over against the action of the spring S_1 and close the contact C_1. The contact C_1 completes the circuit beween the generator and the battery, and the battery starts to charge, the current passing through the series winding M_2 and the winding M_3 on the second electromagnet. When this current exceeds a certain value the armature A_2 is drawn over by the magnetic pull and the contacts at C_2 are broken and the resistances R_1 and R_2 introduced in series with the field windings. The field current decreases in value, and, hence, the generated voltage which causes a decrease in the value of the charging current increases. As the charging current decreases in value the magnetic pull on the armature A_2 decreases, and finally the spring S_2 pulls the armature away from the core of the electromagnet and the contacts at C_2 are closed. The closing of the contacts at C_2 short-circuits the resistances R_1 and R_2. The voltage of the generator then starts to build up, and the above cycle of operations is repeated many hundred times a minute.

A connection is made to the winding M_3 at the point D, as shown in the figure, and the current for the lamps passes through only a portion of the winding M_3. The current delivered by the generator with the lamps turned on will be greater than when the lamps are turned off, for the following reason: When the lamps are turned on the magnetic pull on the armature A_2 is due to the magnetic action of the charging current going to the battery and passing through the entire winding M_3 plus the magnetic action of the lamp current passing through the part of the winding M_2 from the left-hand end to the point D. It is obvious that the total magnetic action of these two currents will be less than the magnetic action of a current equal to the sum of the two and passing through the entire winding. Hence, since the magnetic

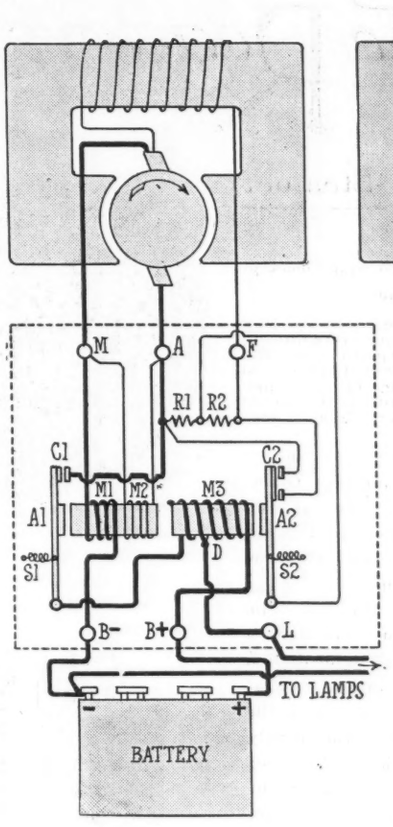


Fig. 149—Here the lamp load affects the vibrator so that the generator output increases when the lamps are lighted and the engine is charging the battery

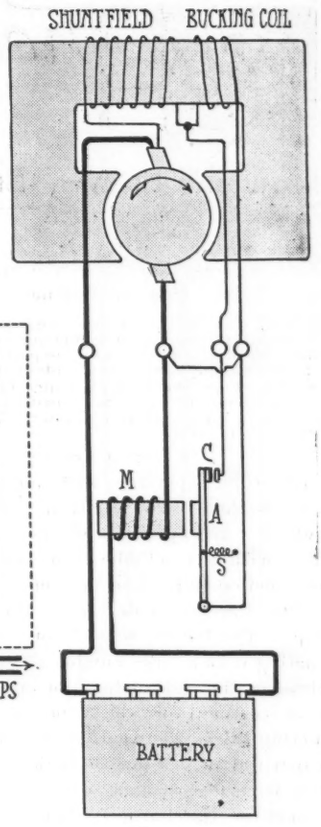


Fig. 150—This system of electrical connection makes use of a vibrating magnet in combination with a bucking coil. Such regulation is seldom encountered, however

action on the armature A_2 is to be the same when the tension of the spring S_2 is overcome, no matter whether the lamps be turned on or not, the sum of the lamp current and the current to the battery will be greater than the current to the battery when the lamps are turned off.

Energizing the Bucking Coil Intermittently by Means of a Magnetic Vibrator: A system of regulation, that is very seldom encountered, makes use of a vibrating magnet, similar to those previously described, in combination with a bucking coil. The principle of operation of such a system can be easily understood by reference to Fig. 150. The resistance R in Fig. 145 has been replaced by an additional field winding, which carries a current when the contact C is open. The direction of the current in the bucking coil is such as to produce a magnetizing effect in the opposite direction to that produced by the current in the main or shunt field winding. Some systems have made use of the bucking coil in parallel with the resistance, and only a part of the shunt field current passed through the bucking coil.

NEXT WEEK

The next installment of the series on Electrical Equipment of the Motor Car will continue the consideration of electromagnetic regulation, beginning with an exposition of the electromagnet used in COMBINATION WITH A CARBON FIELD RESISTANCE.

The Readers' Clearing House

How the Stanley Steamer Operates

Method of Generating Steam and Description of Engine

CHICAGO—Editor Motor Age—Kindly give an illustration and information regarding the Stanley motor, and explain how the steam is generated. Also explain if the steam is at high pressure at all times or just when in the cylinders. In other words, is the steam ever cut off from the engine while in motion?—I. G. Wilcox.

In Fig. 1 is shown the Stanley burner with the vaporizer and mixing tubes. The bottom view gives a view of the cylinder arrangement of the Stanley engine with the cylinders cut away to show the piston and valve motion.

The Stanley boiler is of the fire tube type. The burner consists of a corrugated casting with a large number of holes drilled through the flat surface on either side of each corrugation; the vaporizer; and the mixing tubes. The fuel becomes thoroughly vaporized in passing through the tubes of the vaporizer, which are exposed to the flames of the burner. This vapor issues at high velocity from the nozzles and passes into the mixing tubes, drawing in with it the air necessary for good combustion. It then enters the chamber below the casting and passes through the drilled holes, where it burns in a blue flame. The pilot light acts similarly, but it has a small independent casting. The pilot light, burning directly under the vaporizer, keeps it hot while the main burner is not burning, and will relight the main burner after it has been shut off by either the automatic or the hand sleeve. Water surrounds the fire tubes and is generated into steam.

The Stanley engine is two-cylinder, double-acting type, very similar to a railroad locomotive. Being of the double-acting type, each piston gets an impulse at each end of the cylinder. The cutaway illustration is thoroughly explanatory of the valve action in this motor. The steam in the boiler is of high pressure at all times. Of course the steam is cut off from the engine when the throttle is closed.

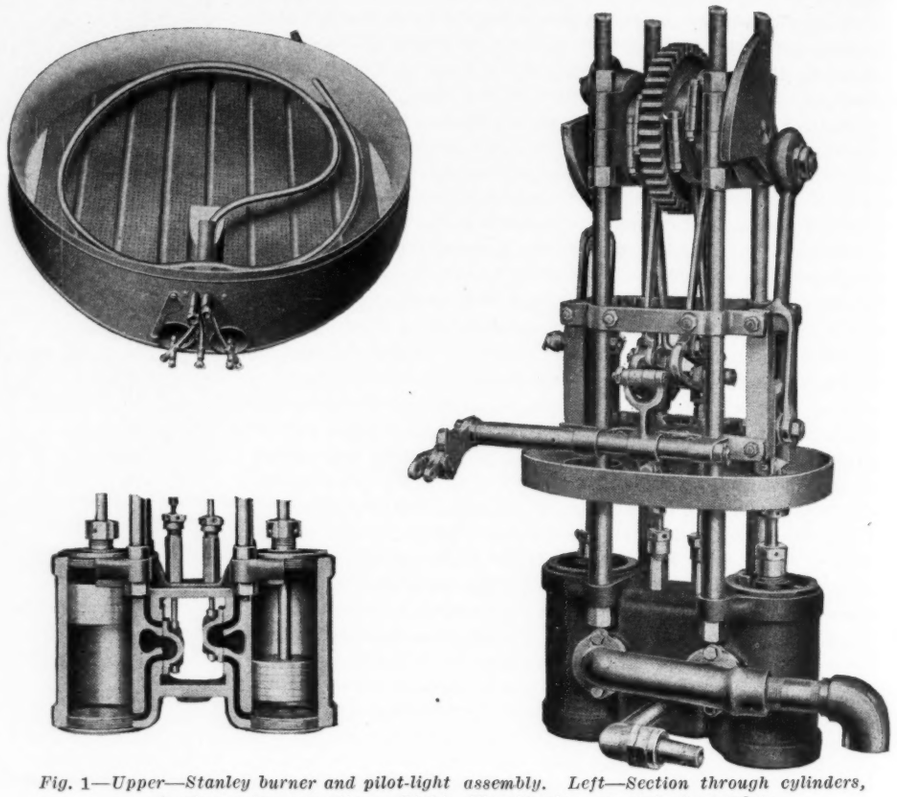


Fig. 1—Upper—Stanley burner and pilot-light assembly. Left—Section through cylinders, showing valve operation. Right—The Stanley powerplant complete

TIRE SIZE VERSUS MOTOR POWER

Larger Tire Does Not Affect Gear Ratio in Rear Axle

Wanamingo, Minn.—Editor Motor Age—How much will the gear ratio be increased if 31x3½-inch tires were used instead of 30x3½-inch? Will the increase in gear ratio be enough to interfere with the hill-climbing ability of a Ford car?—Helmer Rimness.

The gear ratio will not be increased at all. Gear ratio is the ratio of the motor revolution to the drive shaft revolution. The size of tires has nothing to do with it. The change that is brought about by larger tires is in the speed of the car with relation to the revolution of the motor.

Consider the gear ratio fixed at 3½ to 1, which is approximately the standard Ford ratio. With 30-inch tires the circumference of the wheel is naturally less than 31-inch tires. Therefore, with each revolution of the axle, the car does not go as far ahead with the smaller tire as it would with the larger. The circumference of a 30-inch tire is approximately 94 inches. That of a 31-inch tire is approximately 97 inches. Therefore, with 3½ revolutions of the motor with the smaller tire the car advanced 94 inches and with the larger tire 97 inches.

Looking at it another way, a 30-inch tire will revolve approximately 675 times per mile. A 31-inch tire will revolve approximately 653 times per mile. With the former the motor revolutions will be about 2,362 and with the latter about 2,285 per mile. You can see from these figures that the difference in ratio between the speed of the motor and the speed of the car with the two sizes of tires is not enough to materially effect the power and the hill-climbing ability would not be appreciably diminished.

IGNITION CURRENT FROM BATTERY

Formula For Motor R. P. M. When Wheel Size and Gear Ratio Is Known

San Francisco, Cal.—Editor Motor Age—In cars equipped with the storage battery generator system of ignition, is not my understanding correct when I say that until such time as the generator has attained sufficient speed the current for ignition is being taken from the battery?

2—If that be so, supposing the generator got out of order, and the battery be in good order, cannot the battery be used to run the car to its destination, provided the Remy coil and distributor be in good order? In other words, if the generator be not working, cannot the car be brought to its destination taking the current for the ignition from the storage battery?

3—Can Motor Age give a formula to find the number of revolutions the engine is making per minute when the car is going at a certain rate of speed—the gear ratio of the car being known?

4—I have a Studebaker Six, Series '17, which, of course, is equipped with a "tell-tale" device built on the dash board as part of the regular equipment. It shows, as all of them do, charge or discharge, as the case may be, but one cannot know what rate of amperage is being forced into the battery. Could, therefore, an ammeter be used in addition to this, to show the driver what the generator is doing? Would it do any harm to the electrical system of the car? If it could be used to advantage, how should it be connected?

5—Is my understanding on this point correct? Assuming that the hydrometer shows the battery to be, say, three-quarters charged, with the lights out and the car being run at about 20 miles an hour for a distance of approximately 80 miles at that same speed, if the generator furnishes about 15 amperes for the battery at that speed and inasmuch as the battery is three-quarters charged already, should not the battery show full charged upon reading when returning from such a trip? Fifteen amperes an hour for 4 hours steady would mean 60 amperes, but inasmuch as the battery, according to the hydrometer showed three-quarters charged, or 75 amperes there all told, it only needs 25 more amperes to complete the 100 mark. We have a brand new Studebaker Six, with 100 ampere-hour Willard, and have since July 10, 1916, gone about 2,300 miles. Of this distance nine-tenths was run at 20 miles per hour, so as to give maximum charge rate. We take very good care of keeping water in it, but still the hydrometer does not seem to show it fully charged. The hydrometer is not cracked.

6—Is it true that the Stanley steam car cannot be entered in an automobile race? If so, can you give the reason for this? The 1916 model Stanley seems, according to the literature, to be all it claims to be, but I have heard that it is dangerous.

7—Is it not true that with the storage bat-

tery-generator system of ignition an even amount of current is being delivered for ignition, no matter what speed the engine is going? —Joseph A. Lee.

1—Yes. The current is always taken from the battery. At charging speeds, however, the drain is less than the supply from the generator.

2—The car may be driven home on the battery, providing the wiring is such that a dead generator will not short circuit the system.

3—With the wheel diameter and gear ratio known the following formula will give very close results:

$$R = \frac{336 \times S}{D}$$

R is the revolutions per minute of the wheels, S equals the car speed in miles per hour and D equals the wheel diameter in inches. Multiply this result by the gear ratio and you have the motor speed.

4 — An ammeter can be connected in place of the device you speak of, which is really an ammeter without the graduations marked on.

5—Such running should put the battery back to full charge. Possibly the generator is not delivering as much current as you think it is.

6—Steam cars are barred from racing in meets sanctioned by the American Automobile Association. The Stanley is not dangerous.

7—Yes and no. If the battery is fully charged the delivery is practically even. If partially discharged the delivery jumps up to the approximate maximum at the time the generator cuts in.

FORD KNOCKS AFTER OVERHAULING

If All Bearings Are Tight Trouble Is Probably Piston Slap

Cloud, N. M.—Editor Motor Age—I have a model T Ford which has a knock in the motor at all times. I have taken up the connecting rod bearings, put on new rings and one non-leak ring on the top of each piston. The knock stops when No. 2 cylinder is shorted. In shorting the other cylinders the knock is still plain. If it was the center crankshaft bearing, why would it stop when shorting No. 2 cylinder, and not No. 3?

2—In adjusting the clutch I turned the adjusting screw up one turn and it stopped the clutch from sticking, but it drags so that it makes the car crank hard without jacking up the rear wheel, and when I loosen the adjusting screws one turn, the clutch slips so badly that it will run for just about 50 yards before it takes hold on high.

3—In the August 17 issue of Motor Age is published instructions for charging a Ford magneto. It says to use 110-volt lighting circuit direct current. How can I tell if my lighting circuit is direct or alternating current?—J. Holland.

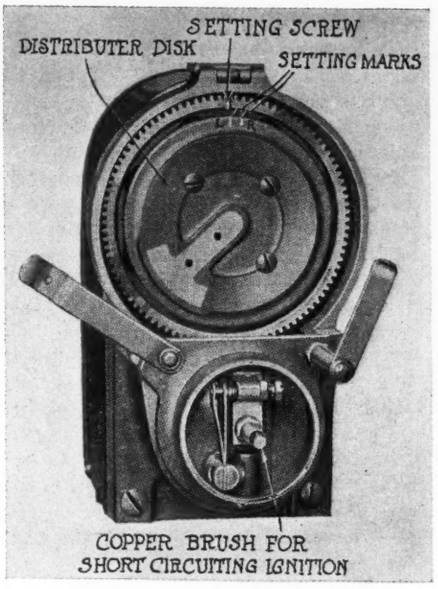


Fig. 2—End view of Eisemann magneto, showing timing marks

1—If the connecting rod bearings are tight, the knock probably comes from a loose piston. Wear has worn the piston or cylinder out of round and a slap results.

2—The clutch plates have become worn so thin that there is no easy adjustment possible. Replace the worn clutch plates.

3—You cannot use an alternating current in this manner. Call up the office of the company which furnishes current in your city. They will tell you whether it is direct or alternating.

HOW TO TIME EISEMANN MAGNETO

Setting Is Determined By One of Two Marks, Depending On Rotation

Toledo, O.—Editor Motor Age—Can a self-starter be installed on a baby grand, 1912 model, without changing the flywheel?

2—What make of starter can be used on this car.

3—How is the Eisemann magneto, type G-4, timed?

4—Does Motor Age think the Cyclopedia of Automobile Engineering worth purchasing?—H. Wichman.

1-2—By baby grand you undoubtedly refer to Chevrolet and our records show that the first Chevrolet put out bearing this name was in 1914. The first Chevrolets built were 1913 models and were known as little sixes. The first baby grand was starter equipped. You may see from this that we are at a loss to know what model you have and without knowing can give you no accurate information.

3—As the spark occurs when the primary circuit is broken by the opening of the platinum points on the make-and-break mechanism, it is necessary that the magneto be so timed that, at a full retarded position of the timing lever body, the platinum contacts will open when the respective pistons of the motor has reached its highest on the compression stroke. Turn the motor over with the crank until the piston of No. 1 cylinder, that is the cylinder nearest the radiator, is at top dead center. Remove the distributer plate from the magneto and turn the driving axle of the armature until the setting mark on the distributer disk is in line with the setting screws, as shown in Fig. 2. For a magneto rotating clockwise use setting mark R, and for counterclockwise use mark L. With the armature in this position the platinum contacts are just opening and the metal insert of the distributer disk is in connection with the carbon for No. 1 cylinder.

4—Yes.

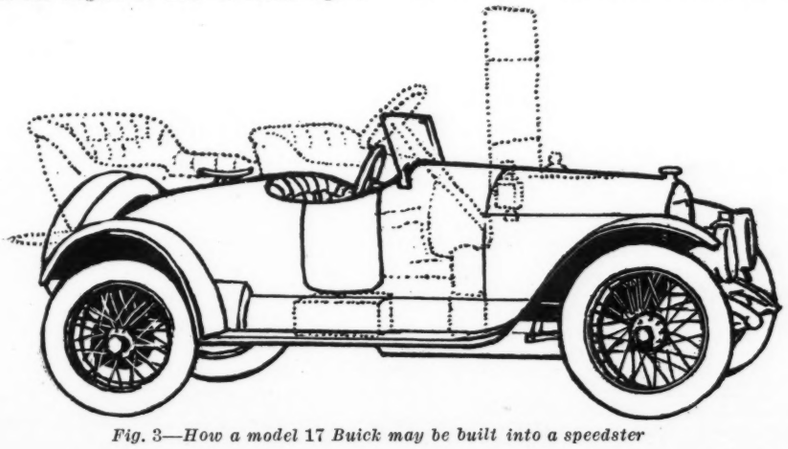


Fig. 3—How a model 17 Buick may be built into a speedster

HIGH-SPEED CAMSHAFT FOR FORD

Standard Shaft May Be Altered or Special One Purchased

Hobart, Okla.—Editor Motor Age—Could Motor Age give me some information in regard to a high-speed camshaft for a Ford car?—V. Brooks.

A high-speed camshaft may be purchased or the regular camshaft may be altered. The alteration process means that the cams of the regular camshaft must be so ground down on the sides that the opening and closing of the valves is quicker. In other words, the sides of the cams must be steeper with less "drag" on the top of the cam. It is a job which requires a good deal of skill and should be done by a man who knows just what he is endeavoring to accomplish. D. F. Noonan Mfg. Co., Paris, Ill., is marketing a specially designed camshaft, in which the valves are lifted slightly higher than by the standard camshaft and the intake is opened before the exhaust closes. The intake valves are opened 5 degrees before center and closed 40 degrees after center. The exhaust opens 51 degrees before center and closes 18 degrees after center.

INCREASING SPEED OF FORD CAR

Lightening of Parts Can Be Overdone—Do Not Drill Connecting Rods

Detroit, Mich.—Editor Motor Age—I wish to convert a Ford car into a racer and would appreciate the following information:

1—After removing the magneto from the flywheel, would it be advisable to make the flywheel lighter?

2—Is the correct method of balancing the crank and flywheel done by rolling on horizontal bars?

3—After drilling connecting rods, would it be best to lighten cast iron pistons with aluminum or semi-steel?

4—Would Motor Age advise planing metal off the cylinder block to give higher compression? If so, how much? Would ⅛ inch be too much?

5—Why is it that water-cooled motors with open ports are not made? Could this be done successfully as in motorcycles?

6—What gear ratio should be tried after the car has been rebuilt? I know there is no exact figure for this, but what has been found most successful?

7—Would it be best to make a special camshaft, or would stock do if timed properly? Kindly give a drawing of the valve timing for high speed.

8—If these changes were made by a good mechanic, what speed could be obtained, it being understood that the car is made as light as possible and a good body made to reduce wind resistance?

9—Will thermo-syphon cooling be satisfactory for races of more than 100 miles? I intend using a Bosch magneto.—F. H. Baker.

1—No. Reduced weight is not going to increase a maintained maximum speed enough to make the alteration worth while.

2—It is a good method.

3—Be careful how much you drill the connecting rods. They are light in their standard form and too much drilling will so reduce the factor of safety that they are liable to let go and ruin the crankcase and other internal parts. Alloy pistons, or semi-steel, if properly fitted, will increase the speed.

4—No. Increase the compression by the use of non-leaking rings.

5—This alteration was made on one of the Fords entered in the recent Ford race on the Chicago speedway. The car was flagged from the course because it went so slow the judges considered it dangerous. Porting will not help appreciably. Better to install large exhaust pipes and possibly increase the intake and exhaust valves ⅛ inch.

6—A ratio around 2⅞ to 1 is good for large tracks. For half-mile work about 3 to 1 is better.

7—Valve timing does not need to be changed. A camshaft which imparts a quicker lift and drop to the valves will increase the speed.

8—On the Chicago speedway, Ford cars with very few changes attained a speed around 65 miles per hour. One of the expensive special built jobs which has nothing much Ford about it except the motor block proved capable of 80 miles per hour.

9—Yes. Cars driven at high speeds cool easily. It was surprising the small amount of cooling trouble which was experienced at the Ford Chicago race. Most of the cars had special radiators, however, either new ones of a larger capacity or Ford radiators with a tank built on to hold more water.

PECULIAR OPERATION OF STARTER

At Times Motor Fails to Turn Over, Then Works Properly

Peoria, Ill.—Editor Motor Age—I have a Westinghouse starter on my car which, at times, will not turn the motor over when the switch and starting pedal is on; then as I take my foot off the starting pedal and wait a moment and try again, the engine starts immediately. The battery is fully charged. What causes this?

2—The lights on the car burn well for several evenings at a time, then they will appear very bright, way above the normal power and burn as if an electric bulb were used many times the size. I have looked over the wiring for cross wires or grounds, but fail to discover anything wrong. What is the cause of this? It happens only when the car is in gear.

3—Does Motor Age know if the Nitrojector searchlight that was illustrated in the issue of October 12 is being put on the market, or is this an advance notice of the manufacture of the same?

4—Does Motor Age know of any house that carries photos of various race drivers and their cars?—George K. Wing.

1—Probably the connections in the starting switch have become worn or sprung out of place so that a good contact is not always created. Disassemble the switch and examine it yourself or have it examined.

2—This would lead one to believe that the automatic regulator was not working properly at all times. If the regulator does not operate the generator builds the voltage up and thus brightens the lights. It is a dangerous symptom, and should be investigated by an expert electrical man. Are you by any chance being deluded in the power of the lights? With the battery slightly run down, the lights will always brighten up considerably when the generator begins to deliver current to the storage battery, namely at a speed of from 10 to 15 miles per hour.

3—The searchlight is already being manufactured in quantities.

4—Burke & Atwell, 173 West Madison street, Chicago; Underwood & Underwood, 422 South Dearborn street, Chicago; International News, 336 West Madison street, Chicago.

Worm Drive and Coasting

Maynard, Ia.—Editor Motor Age—With a worm-drive truck, is it impossible for a car to coast downhill with the clutch disengaged? It seems to me that, if coasting were impossible, when the driver would throw out the clutch to change gears the car would come to a standstill due to the locking of the worm. Kindly explain this.—C. O. Hall.

A worm drive truck will coast down hill with the clutch disengaged. There is more friction in a worm than in a bevel drive when coasting, but it only has a braking effect and does not lock the wheels as you seem to think.

LAYOUT FOR SMALL MACHINE SHOP

Compact Arrangement of Equipment for Corner of Garage

Fort Worth, Tex.—Editor Motor Age—I would appreciate some help in laying out plans for a garage. I repair Chevrolet and Chalmers cars exclusively, and have under construction a new shop 50 by 100 feet, and would like to install an electric motor for working in green motors, also to run a lathe, drill press, air compressor and other minor machinery. What size motor should be used for this purpose, and explain how same should be hooked up?—A. B. Tinsley.

You will find illustrated in Fig. 4 a top view and side view of a layout for an electric motor and lineshafting arrangement which should meet your requirements. Using small machinery, which you probably will, a 5 horsepower motor should give ample power. The arrangement is compact and still allows plenty of space for additional pulleys to the lineshaft. Three hangers should give sufficient support for a lineshafting 15 or 20 feet long.

Regarding pulley sizes, that is a matter that we cannot specify. You must first find the turning speed of the electric motor and fit pulleys of a size that will permit a lineshaft revolution of about 200 revolutions per minute. Then ascertain the speeds the various machines should turn and determine the pulley sizes accordingly. You should support the motor on a substantial

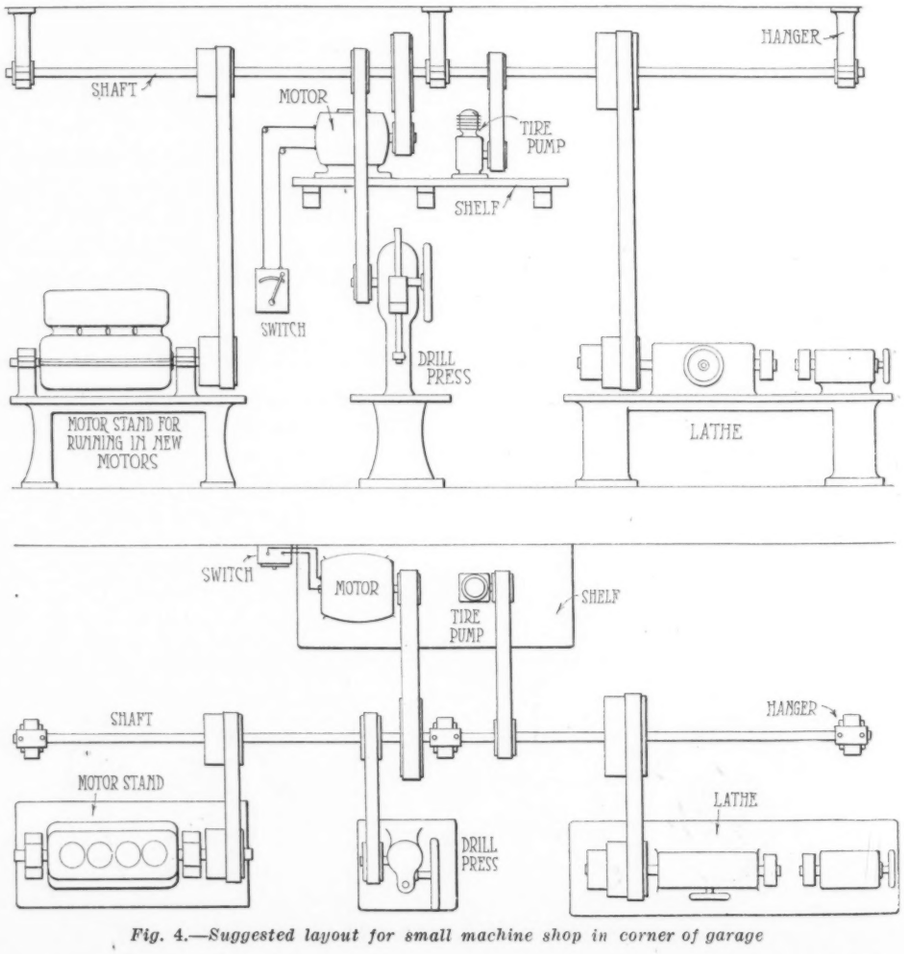


Fig. 4.—Suggested layout for small machine shop in corner of garage

wall bracket, where it is out of the way of meddling hands, and there is no reason why this same platform cannot be utilized for the air pump, connecting it with the lineshafting as shown. The motor switch can be installed on the wall under the platform as shown.

The stand for working in green motors would probably be a special made affair and should be connected with the lineshaft to give a motor revolution of about 500 revolutions per minute.

TIMING OLD CONTINENTAL MOTOR
Proper Setting May Be Made With Use of Ordinary Protractor

Mo. Valley, Ia.—Editor Motor Age—I have an old Continental T-head motor valve shafts gear-driven. The motor is off time and I am unable to get it timed just right. Can Motor Age give me the correct setting? Please advise.—W. H. H.

If you are unable to find timing marks on the flywheel the valves may be set with the use of an ordinary protractor. Refer to Fig. 5.

Set the motor so that the piston in No. 1 cylinder, namely the cylinder nearest the radiator, is at the top of its stroke. With the use of the protractor or with a square, make a mark at A on the rim of the flywheel, which mark will be directly above the center of the crankshaft.

Then, with the protractor placed against the flywheel so that the 90 degrees mark points directly toward mark A, go 12 degrees to the left on the protractor, or counterclockwise on the flywheel and make a mark at B. This mark will be 12 degrees to the left of mark A. Now turn the motor over, clockwise, of course, until mark B is at top center.

With the motor in this position mesh the timing gears so that the intake valve of No. 1 cylinder will just start to open. This should give the motor correct timing.

OVERSIZE PISTONS — LESS POWER
Blames Trouble to Carbureter and Magneto Which Have Not Been Changed

Ogden, Utah—Editor Motor Age—Last spring I gave my 1914 Ford a thorough overhauling, fitting new oversize pistons and rings, ground in new valves and springs, fitted everything new about the ignition system, improved the cooling system, and in fact made everything practically new about the engine except the magneto and carbureter. The engine works fine in every way since, but does not develop its original power. The compression is good, and I am at a loss to know where to look for the trouble unless it is because the magneto is weak or the carbureter at fault, or both. I have had the engine examined by Ford experts, but they can find nothing wrong nor suggest any cause for the lack of power.

Can Motor Age suggest where I could look for the trouble, also tell me how I may test the magneto to determine just how many amperes of current it is developing, and also tell me how I can determine if the carbureter is at fault without buying and experimenting with new ones until satisfied?—Sidney Smith.

You state that you made about everything new on the motor except the carbureter and magneto and then you lay the loss of power at the door of these two instruments. This appears inconsistent. Fitting oversize pistons and rings is a delicate proposition which, if not properly handled, will reduce the power instead of increasing it. Of course, there is no means of ascertaining whether the trouble lies there from the description you give. Have

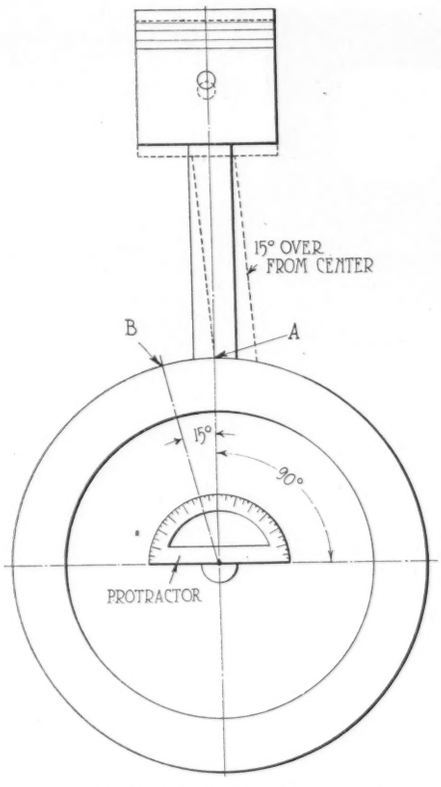


Fig. 5—Suggested method of timing valves with use of protractor

you given these new pistons and rings a chance to wear in? It requires 500 or 600 miles to get such new parts fitting properly. It is our frank opinion that your trouble is neither in your magneto nor carbureter.

Noise in Flanders Axle

Cloquet, Minn.—Editor Motor Age—I have a Flanders 20, which when running faster than 15 miles per hour makes a noise in the transmission and differential gears. I have had the car overhauled in Chicago, but the noise is still present. It sounds like a trolley car going at high speed.—A. LeRoy.

The noise comes from the bevel pinion and ring gear, unless we are very much mistaken. Either these meshing gears are very badly worn or they are out of adjustment. The way to find out is to examine them yourself or have them examined. If the gear teeth seem to be in very fair condition the trouble is in the adjustment. If the teeth are pitted and chipped they need replacement. The adjustment of the gears in this particular differential assembly is a matter of shimming behind the bearings and should be done by a repairer that knows just how gears should be properly set.

Setting Valves by Mark

Hastings, Ia.—Editor Motor Age—I have a Maxwell motor model D, that has been torn down by someone who did not know his business and reassembling got the valves out of time, some new cams have been placed on the shaft, but look to be all right as to position.

I would appreciate instructions and drawings, if possible, on timing this motor.—A. S. Mills.

On the face of the flywheel you should find a mark which will give the correct timing of the valves. This mark, which will be a line scratched onto the side of the flywheel rim, should be placed directly on top of the revolution. The camshaft gears should then be so meshed that the inlet valve of No. 1 cylinder will just start to open. If you are unable to find the mark, Motor Age will chart it out for you. The degree process is far less simple than setting the valves by the mark.

Non-Leaking Rings in Bottom Groove

Maywood, Mo.—Editor Motor Age—Is one groove better than another in using patent rings in the piston? I refer especially to Ford cars in which one desires to improve the compression and also overcome the free oil in the cylinder without replacing all with patent rings.—M. R. Kelley.

The bottom ring is preferable, for the reason that it is better to stop the oil from pumping at the lowest possible point. A further advantage is that it does not allow excess oil to enter between the rings, which would be the case were the non-leaking ring placed on top.

Lowering Ford Wheel

Oskaloosa, Ia.—Editor Motor Age—Where could Ford reverse, clutch and brake pedals be purchased which accommodate a lowered steering column?

2—Of what kind of steel are the Ford drive pinions made?—Ralph Deck.

1—With the present pedals the steering column can be lowered about 15 inches, which is about as low as it could be used in any design of speedster body. We know of no maker of pedals such as you describe.

2—Ford gears are made of vanadium alloy steels.

N.A.C.C. HORSEPOWER COMPUTATION

Dexter, Mo.—Editor Motor Age—Advise if it is logical that a spark plug having several firing points will continue to give satisfactory service after one or more points have become fouled. Is it logical that the current would go to another gap and jump across?—George A. Evans.

1—The plug will operate until all points are fouled unless some of the points are short-circuited by deposits.

Marvel on Buick Six

Scott City, Kan.—Editor Motor Age—Will you publish a diagram showing how to adjust a model L Schebler carbureter, such as is used on the model D 45 Buick six?—J. H. Dague.

1—The D-45 Buick six was equipped at the factory with a Marvel carbureter. However, if the car in question has a Schebler we will print instructions for adjusting upon your advice.

Litres to Gallons

Habana, Cuba.—Editor Motor Age—Give the exact equivalent of one gallon in litres.—E. S. Marti.

There are 4.1638 litres in a gallon.

Herring-Bone Gears

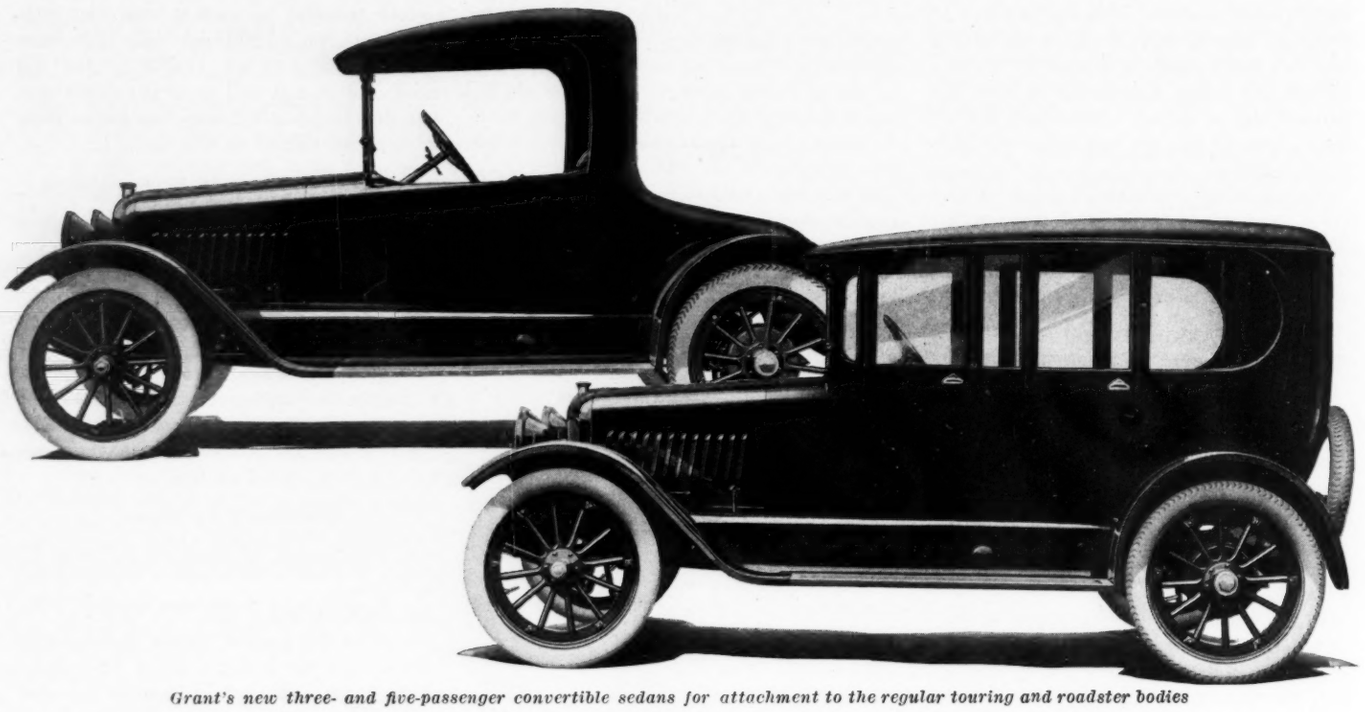
St. Louis, Mo.—Editor Motor Age—Kindly state why herring-bone gears are not generally used for driving cam gears.—P. J. McCullough.

A herring gear is very little, if any quieter than an ordinary spur gear. Spiral cut gears are used in a number of cars, principally for quietness.

Racing Body For Old Buick

Albia, Ia.—Editor Motor Age—I have a model 17 Buick which I am desirous of converting into a roadster. If Motor Age has any designs which could be worked out in an ordinary tin shop, I would like to see them.—W. G. Clark.

A body built along the lines shown in Fig. 3 would transform your old car into a very good looking speedster. It should not be difficult for a man well equipped to handle sheet metal work to build up such a body as this.



Grant's new three- and five-passenger convertible sedans for attachment to the regular touring and roadster bodies

Grant Offers Two Convertible Winter Bodies

AFTER experimentation covering a period of several months the Grant Motor Corp., Findley, O., announces two new convertible bodies—a five-passenger sedan and a three-passenger enclosed roadster.

Both models are constructed with the frame of hardwood, mitered and mortised, glued and screwed together into solid framework. The frame is substantially braced with irons to make the top rigid. The deck of the top is constructed with transverse bows covered with poplar slats. The deck is then covered with a layer of wadding which, in turn, is covered with cheese cloth over which is stretched a water proof covering of high-grade material.

The rear quarters are made with upright bows, which are covered with sheet steel, which in turn is covered with the same materials as the deck.

The exterior forward of the D-shaped windows is painted with twenty-coat, hand-brush work. The interior is trimmed in heavy head lining of an artistic pattern.

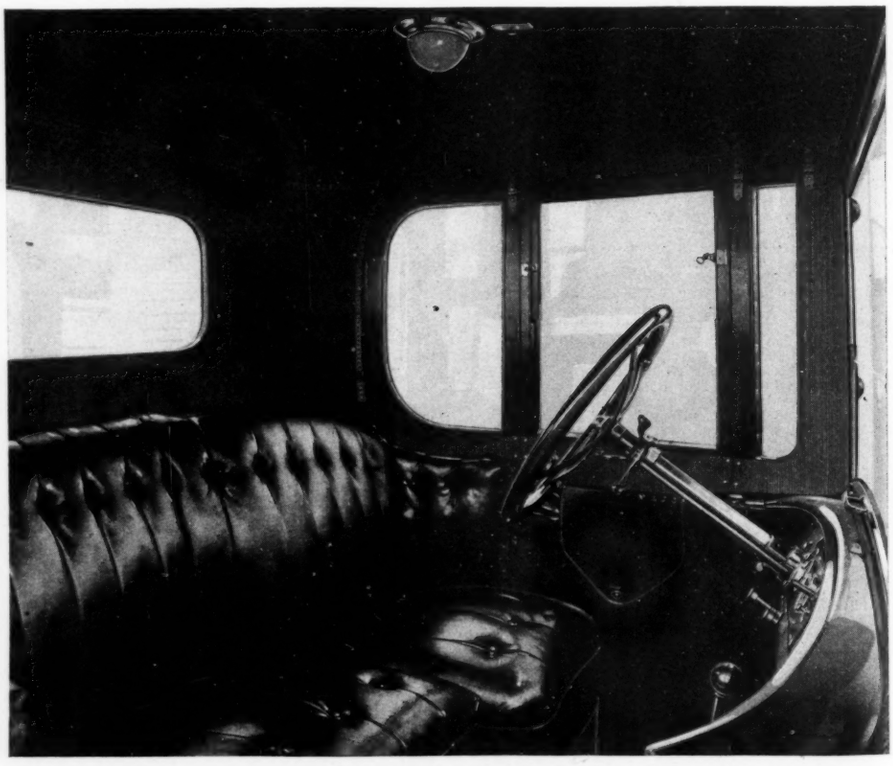
All windows and doors are easily inserted and removed. An electric dome light with frosted cut glass rosettte is built into the center of the top interior. The dome light is equipped with an Ediswan switch and is wired so that attachment to the electrical system, when the top is put on, is a very simple matter. It is operated by a nickel push-and-pull switch.

TIRE FACTORY IN CANADA

New York, Nov. 10—A factory in which pneumatic tires of both the fabric and the cord type will be made has just started in to operate in Toronto.

This is owned by the van der Linde Rubber Co. and is backed by several men who have been interested in the Canadian developments of Bakelite by the firm of Plastics, Ltd. It is understood that the two concerns will work together, although they will have separate financial organizations. Deliveries of tires are due to commence about the middle of January and only the fabric type will be made at first.

The company has a new design of cord tire in which the threads are arranged almost radially instead of at the considerable angle customary in cord tire construction. This is planned to give the casing a greater strength and also to increase its resiliency from 2 to 5 percent.



Interior of Grant three-passenger enclosed car, showing arrangement of windows and location of dome light

Miller Carbureters Prove Their Mettle

Pronounced Use This Year in Speedway Races Shows High Average Results

INSPECTION of the equipment tables in the race meeting reports of the 1916 season shows the name Miller in the carbureter column for a majority of the prize winners. The most recent demonstration occurred in the Harkness trophy race on the Sheepshead Bay speedway when the winners of the first six places had cars fitted with Millers.

A striking feature of the carbureter is it unusual simplicity. There is no adjustment. Speed changing is taken care of by a series of jet posts, arranged annularly, with a flanged top fitting the throttle chamber and fed from a gasoline well below, the entire unit from the rim to the flange being surrounded by an air chamber.

Position of Sleeve

With a closed throttle, a sleeve which fits within the jet post rests at the bottom of its own travel by gravity. In this position all air opening and all jets but one are closed.

As the throttle is opened, suction from the motor through the manifold causes this sleeve to raise and it uncovers, one by one, the jets. These jets, eleven in all, are placed at graduated heights. As more jets are exposed more air is admitted to the mixture through the opening in the jet posts.

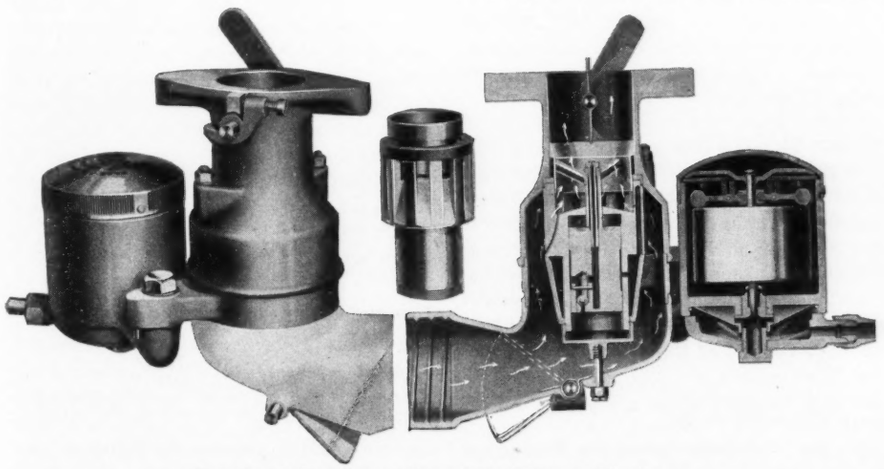
It is only when the motor is traveling at maximum speed that all jets and air spaces will be uncovered. The jet openings created by the raising of the sleeve are, in number, directly proportional to the speed and load of the motor.

This automatic carburetion assembly is shown in the center figure on this page. The suction sleeve is shown lifted slightly from the bottom of its stroke. This sleeve is surrounded by a ring which fits the throttle chamber and below the ring are jet posts. The opening between the jet posts permits air to enter from the space on the outside.

To permit steady rising and falling of the suction sleeve and avoid fluttering, its lower portion is in the form of a plunger weight which fits into a small cylinder. Gasoline is admitted into this cylinder from the well. This small quantity of gasoline below the plunger remains at a fixed level regardless of the throttle demand, which furnishes a positive check on the sleeve.

The efficiency, it is claimed, comes about through the close association of air with the jet openings. Air on all sides must pass close to a jet and the suction draws gasoline and air from the same points.

The carbureters are made from brass and alloyanum. The float chamber, throttle chamber and jet unit holder being of brass and the multiple jet unit and sleeve being of the latter metal. The Miller Carbureter Sales Corp., Chicago and Los Angeles, Cal., is distributor. Prices range from $22.50 for Ford size to $65 for a 2½-inch opening.



Exterior and cut-away view of the Miller carbureter

TEMPLARS MOTORS CORP. FORMED

Cleveland, O., Nov. 10—The Templars Motors Corp. has been formed and will manufacture a four-passenger roadster at $1,250, a five-passenger touring car at $1,250, a five-passenger sedan at $1,850 and a two-passenger roadster at $1,225.

HOLD CAR FOR TAX FEE

Spokane, Wash., Nov. 11—Officials in Nez Perce county, Idaho, recently seized an Oldsmobile which was in the possession of R. D. Preston, motor car salesman of Washington, and held the machine until an Idaho license was paid. The owner had a Washington dealers' license, but it was declared that this did not permit the holder to carry on sales in Idaho. The owner was required to pay the license fee of $15.

It was explained that the dealers' licenses issued by states apply only to sales of cars in states where the license is issued. The car was seized as soon as it was learned the owner was negotiating sales in Oregon. If the practice is continued the treasury of Nez Perce county probably will be considerably enriched, as many Spokane dealers sell in Lewiston and other points in Nez Perce county.

CANADA FORD CO. TO MAKE TRUCKS

Detroit, Mich., Nov. 10—The Ford Motor Co., of Canada, Ltd., will begin the manufacture of trucks in March, 1917, according to a recent report.

LA CROSSE TRACTOR CO. FORMED

LaCrosse, Wis., Nov. 10—Stockholders in the Sta-Rite Engine Co., LaCrosse, Wis., have organized the LaCrosse Tractor Co. under the laws of Delaware and will enlarge the scope of the business to a farm tractor industry, which will produce practically all its parts in its own factory. The new corporation is capitalized at $1,500,000, of which $500,000 is preferred and $1,000,000 common. The Sta-Rite company, which was organized about 2½ years ago, has a capital stock of $200,000. It has been manufacturing tractor and general utility gasoline engines, and a year ago began to develop a complete tractor, which is now ready for large production. The chief owners of the company are L. F. Easton, J. M. Hixon, L. Hirshheimer and L. C. Colman.

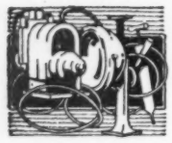
BIG FREIGHT CAR ORDER

Detroit, Mich., Nov. 13—The Michigan Central Railroad has just closed a contract for the construction of 6,750 freight cars of which 4,000 will be cars equipped for carrying motor cars. The contract was distributed among several manufacturers and calls for immediate delivery. The order follows the completion of a contract placed a year ago which has just been completed and included 4,500 motor vehicle freight cars. Improvements have also been ordered by the Michigan Central to increase freight handling facilities.

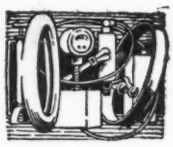
At present it appears as if Detroit's commercial and industrial activities for the winter may be seriously impaired as many roads have placed embargoes on the city owing to the vast number of freight cars here which are standing awaiting unloading by the various companies. It is estimated that more than 20,000 cars are tied up in the freight yards.

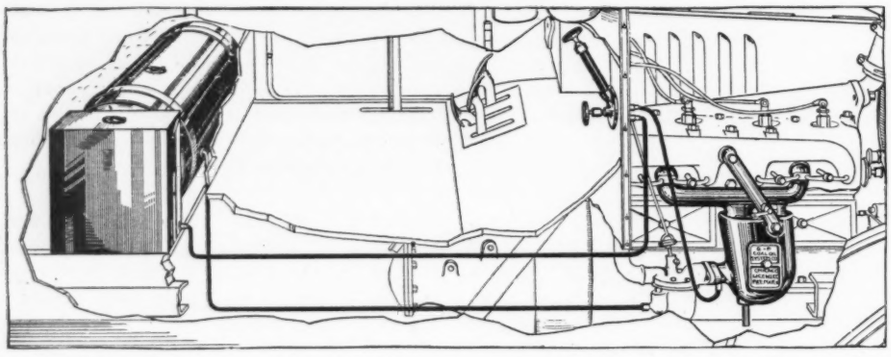
FIELD MOTOR BUYS PLANT

Detroit, Mich., Nov. 10—The Field Motor Co., Grand Rapids, Mich., has purchased the Brown & Sehler factory at Grand Rapids for $14,000 and will manufacture a motor under patents owned by E. A. Field.



The Accessory Corner





G-P coal oil system for Fords and other cars. The same gasoline carbureter is used and the coal oil device placed between the carbureter and the intake manifold. There is an auxiliary tank for gasoline and a two-way valve so that gasoline may be used for starting

G-P Coal Oil Systems

COAL oil systems to take the place of gasoline carbureters have been given much attention since the price of gasoline began soaring and among the latest of these to be put on the market is one made by the G-P Coal Oil System Co., 2332 South Michigan avenue, Chicago, for which is claimed a reduction in the cost of fuel of 31⅔ per cent and an increase in miles per gallon of 33⅓ per cent. Designed for attachment to all cars, although at present made only in size for Fords, it is simple in construction and therefore the possibility of its getting out of order is negligible. The device super-heats the fuel as it passes through and makes for a more perfect vaporization before the fuel enters the firing chamber. There is an auxiliary tank and a two-way valve so that gasoline may be used for making it easier to start the engine. The same carbureter is used as for gasoline and the attachment is between the carbureter and the intake manifold. With this device is furnished a water circulating system designed to give a cool motor at all times.

Prismo Crystal Headlight Bulb

In the Prismo bulb headlight glare is prevented by making the glass bulb of the lamp of prism glass. No separate dimming device is required, and the plain glass lens is used. It is claimed that the resulting light, though diffused, is a most efficient road light. It is made by the Avery P. L. Co., 351 National avenue, Milwaukee. Price 40 cents a pair.

Martin's Rocking Fifth Wheel

The Ford or light roadster may be converted into an L-ton tractor by means of this attachment. The rear deck of the roadster is removed and the attachment bolted in place. It comprises a framework, supporting a hinged platform carrying a swiveled rest to which the front end of the semi-trailer is bolted. It is made in four sizes, the largest for use on 6-ton trucks, the smallest for use on Fords and light roadsters. The common delivery wagon may be converted into a semi-trailer, or one may be purchased direct from this company, and may be attached or detached in a few minutes. It is made by the Martin Rocking Fifth Wheel Co., Springfield, Mass. Price, 1-ton type for Fords or light roadsters, $35; 2- to 4-ton type, $65.

Penfield Spot Light

A small electric light is fastened to the wind shield, and is swiveled so as to permit motion in any direction. Two styles are offered, one having a rear view mirror, and the other plain. They are finished in black with polished nickle trimmings. Price, 6-inch light, with rear view mirror, $7; without mirror, $650. It is made by the Penfield Mfg. Co., Meriden, Conn.

L. Socket Wrenches

The latest offering of the Walden Mfg. Co., Worcester, Mass., is a complete set of socket wrenches having an L-shaped handle. This type of wrench is often preferable to those having a T handle, as they may be used against a wall where the T-handle would be impossible. The set comprises all sizes, from $\frac{7}{16}$-inch to $\frac{7}{8}$-inch, inclusive. Price, No. 400, set of ten, $4; each, 45 cents.

Weaver Tire Changer

In the October 12th issue of Motor Age, in the description of the Weaver universal tire changer, manufactured by the Weaver Mfg. Co., the address was given as Springfield, O., and should have read Springfield, Ill. The device is a garage equipment designed greatly to facilitate the removal and replacement of tires from any type of rim.

Body Brace for Fords

In the Dow body brace for Fords, the running boards, fenders and chassis are reinforced by an angle iron brace bolted to the frame. The running boards rest on the ends of the cross brace; the brace in turn being held to the side members of the chassis frame by two hanger bolts. The brace is made by the Dow Wire & Iron Works, Louisville, Ky. Price, $3.

Perfection Motor Robes

A complete line of heavy fur-lined robes for the motorist is made by the Perfection Robe Co., 12 South Market street, Chicago. The construction is said to be exceptionally durable, incorporating lockstitch sewing, turned fur edges, reinforced borders, and selected fur skin. Each robe carries a metal identification tag, the number being registered with the makers, facilitating recovery if lost. They come in black plush, black Russian cub bear lining, 48 by 60 inches, $9.90; 54 by 66 inches, $12; 60 by 70 inches, $13.50. Other styles in proportion.

J-A-Y Vacuum Gauge

A gauge for attachment to the Stewart vacuum tank, coming into operation each time the auxiliary tank is filled is made by the Webb Jay Corporation, 1008 Karpen building, Chicago. By noting the motion of the indicator hand the driver can determine the rapidity at which gasoline is being consumed, as the auxiliary tank holds 1/40 of a gallon, and the gauge registers each filling. Attachment is effected by replacing the plug at the top of the auxiliary tank with the tubing connection leading to the vacuum gauge mounted on the dash. Price, $5.

Rhodes Overhead Washer

The hose is suspended from the floor and may be readily swung above any point of the vehicle being washed. A wall flange pipe fitting screwed to the ceiling carries a swiveled connection supporting the horizontal distributing pipe. This pipe is rigidly trussed and by means of the swiveled connection the hose may be swung to any point above the car. The electrically lighted type is equipped with lights that are mounted on the swinging arm in a manner that focuses the illumination of the part being washed. Plain washer, bronze finish, $20; No. 2, electric lighted, bronze finish, $45. Vehicle Specialty Co., Inc., 26 State street, Hartford, Conn.

Headlight Dimmer Switch

By means of a button switch located at a point convenient to the driver, a resistance is thrown in series with the lighting circuit, by the Connecticut headlight dimming switch, causing the lights to grow dim. The resistance consists of a small

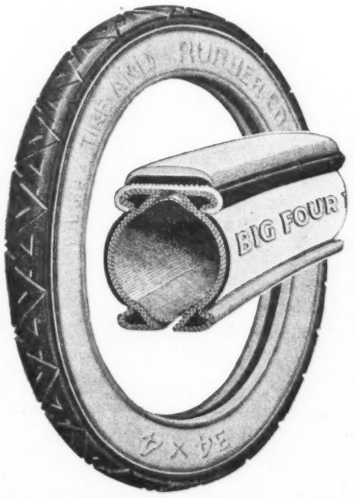
coil of special wire connected at each end to two binding posts secured in the end of a hollow fiber cylinder. On the interior of this cylinder are two brass brushes, secured at one end to the binding posts, the other ends resting on the switch plunger. The inner end of this plunger is uninsulated, and grooved; the balance of the plunger being insulated so that when the plunger is pressed in as far as possible, the ends of the two fiber brushes are disconnected, and the current forced to pass through the resistance wire. By pulling on the plunger, the two brushes come into contact with the metal end, are short circuited, and the lighting current allowed to pass unrestricted. The installation requires only that a ⅞-inch hole be drilled in the dash, the insulating cylinder slipped in place and the plunger plate screwed on to the face of the dash. The lighting circuit is then cut in. One wire of the lighting circuit is then cut at any point, and each of the two ends attached to its respective binding post on the dimming switch. This switch is made by the Connecticut Telephone & Electric Co., Meriden, Conn.

Spee-Dee Cleanser

The hands may be washed without water. It is a gritless compound, applied to the soiled hands and is said to completely dissolve all grease, etc., leaving the hands clean after wiping with a cloth. Price 25 cents per can. Spee-Dee is made by the States Chemical Co., 658 West Austin avenue, Chicago.

Big 4 Tire

Several radical departures from conventional tire construction embodied in the Big 4, include construction in three parts, any one of which may be replaced if damaged, unusually low air pressure required and, according to the manufacturer, positive puncture-proof and nearly trouble-proof qualities. The tire consists of two side walls and a non-skid tread rim, an idea of the construction in which these units are assembled being given in the accompanying illustration. With this tire it is necessary to carry only spare side walls and tubes instead of complete spare tires. The tread rim is claimed to be exceedingly durable and the replacement of the tread on one or both of the side walls is much less expensive than to buy a new tire. Only 25 pounds pressure is required for a 34 by 4-inch size, as compared with 80 pounds for an ordinary tire of these dimensions.



Big 4 tire which is sold in three parts. Only 25 pounds air pressure is required in the 3¼ by 4 size

The company also manufactures tires for truck use which are claimed to give the same high resiliency as the ordinary pneumatic tire and also the uninterrupted service and durability of the solid type. A non-skid tread rim is also made for winter service on the truck tires. It is made by the Big 4 Tire and Rubber Co., 736 Guardian building, Cleveland, O.

Shaft Support for Fords

The drive shaft tube of the Ford, made by the Ekern Bros. Mfg. Co., Flandreau, S. D., is supported by malleable iron braces clamped between the end of the drive shaft tube and the lugs of the differential case. It is claimed that the differential housing and the drive shaft tube are made a unit, and the life of the entire rear assembly promoted. It may be attached in 10 minutes by anyone it is said. Price, $5.

Hand-y Signal

In the Hand-y signal a hand is extended from the side of the car on a lazy tongs device operated by the driver, thus giving warning of an intended stop or turn. It consists of a bright red metal hand, fastened to the end of steel folding members that fold into a metal case attached to the side of the car. The hand is swung to the extended or closed position by a lever on the open car model; on the closed car model it is operated by a chain. It may be attached to any car in 5 minutes, it is said.

It is made by the Hand-y Signal Co., 134 East 110th street, New York. Price, open cars, $3; closed cars, $3.50.

Vincent Steering Wheel

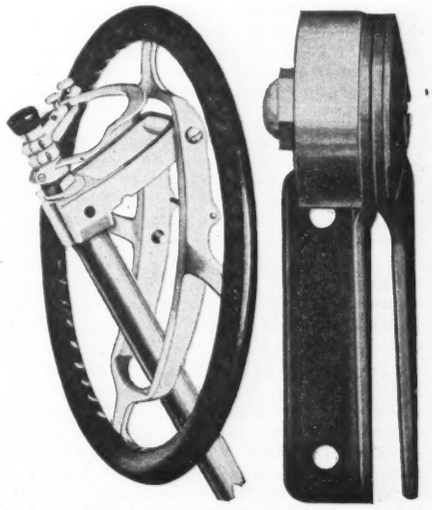
A new type of adjustable steering wheel is found in the Vincent, which gives a clearance of slightly more than 8 inches back of the steering post head with an additional 6 inches clearance of knee room forward of a vertical line from the steering post head to the floor of the car. Pressure of a button drops the wheel and it tilts back without further effort. In operation the parts of the rim toward the driver and also the part toward the windshield move in toward the steering post head, clearing the slanting windshield as readily as the vertical type. The wheel operates in the same space as occupied by any stationary wheel. Locking of the wheel is accomplished by a 7/16-inch taper steel pin on each side of the steering post head engaging in bronze bearing plates which are cast integral with the head itself, and which also form wearing plates. These pins are designed to withstand a shearing strain of upwards of 2,500 pounds. There is a tension adjustment which permits of the driver swinging the wheel back or up into driving position to suit him. Spiders are of aluminum and the rim of the wheel is walnut, although for Fords an ebony type of rim of the 16-inch size is procurable. The Vincent Clear-Room Steering Wheel Co., 756 Woodward avenue, Detroit, Mich., maker of the rim, is producing this wheel in 17- and 18-inch sizes.

Nasco Valve Grinder

Made to grind any valves regardless of size or material from which they are made and at any angle desired, the National Auto Specialty Mfg. Co., Tama, Ia., is marketing its grinder under the name of Nasco at a price of $30. This is essentially for garages and machine shops. Included in the outfit are five pilots ranging in size from 5/16 to ½ inch, four reamers, in sizes ranging from 1⅝ to 2⅜ inches and one reamer handle. The grinder is rigid in construction, is fitted with high-speed bronze bearings and can be operated by belt or hand.

Windshield Hinge

A windshield hinge that is designed to lock and hold securely in eight different positions without the necessity for using wing nuts for tightening in any way is being made by the Illinois Brass Mfg. Co., Chicago. The hinge is made in several sizes to fit all types of cars and trucks. It fastens on the sides of the shield which prevents spreading of the frame, especially where there are no channels to hold it together. Attachment is said to be a matter of 20 minutes. Prices range from $2.50 to $7 per pair, depending on size and quality of finish.



Left—The Vincent adjustable steering wheel. Right—Illinois automatic windshield hinge

Among the Makers and Dealers

LEVITT Joins Chandler Co.—C. S. Levitt, formerly traffic manager for Gaston, Williams & Wigmore, New York City, has joined the export department of the Chandler Motor Car Co., Cleveland, O., with headquarters in New York.

Mosher Leaves Oldsmobile for King—R. N. Mosher, for the last 3 years branch manager for the Oldsmobile in Detroit, has resigned to take charge of the business of the King Auto Sales Co., distributor of the eight-cylinder King cars in Michigan.

Burgess to New Tire Company—W. L. Burgess, St. Louis, manager of the tire and tube department for the Dorris Motor Car Co., has resigned to become sales manager for the Sterns Tire and Tube Co. of that city, whose product will be placed on the market January 1.

Weaver to Schumacker Company—George F. Weaver, formerly branch manager for the Jeffery in Cleveland and later sales manager of the Philadelphia branch, has been appointed manager of the J. Harry Schumacker Co., which handles the Dorris and Moon cars in the latter city.

Tompkins Leaves Times Square Company—Kenneth W. Tompkins, New York city, has resigned from the Times Square Auto Supply Co. to accept the vice-presidency of the Multiple Storage Battery Co. Mr. Tompkins had been with the Times Square company 10 years.

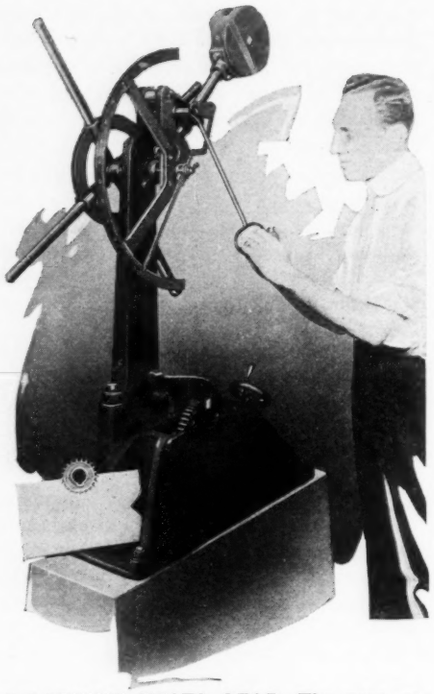
Auto Tire Co. Entertains—The Racine Auto Tire Co., Racine, Wis., entertained its branch managers and salesmen at a convention at the factory recently. The policies of the company and plans for the disposition of the 1917 output were discussed. Managers of the branches at Chicago, Milwaukee, Minneapolis and Des Moines were present.

Enter the Gasco Mfg. Co.—The Gasco Mfg. Co. has been formed at Lancaster, Pa., to manufacture specialties for Fords. R. W. Shreiner is president and general manager. One of the articles to be manufactured is a new cowl dash light for Fords. The company will also put out a new heater for Fords.

Overland Agency Helps Traffic—The Overland-Wausau Co., Wausau, Wis., a large northern Wisconsin distributer of Overland cars, has donated to the Wausau police department fifteen traffic guides bearing the legend, "Keep to the Right." The guides have been placed on fifteen busy intersections and assist materially in regulating traffic.

Considers Employes' Welfare—The Keller Pneumatic Tool Co., Fond du Lac, Wis., has instituted a new idea in welfare work among employes by furnishing an ample supply of certified milk to all workmen while on duty, in place of spring water. It is figured that the physical welfare and efficiency of the workers will be considerably increased and injurious effects of drinking cold water while at work or beer during noon hours will be thereby avoided.

Avery & Sons Increase Capital—B. F. Avery & Sons, manufacturers of gasoline tractors in Louisville, Ky., have filed amended articles of incorporation, fixing the capital stock at $2,300,000, against the old capitalization of $1,500,000. The $200,000 7 per cent series A preferred will be retired and a series known as A1 preferred, consisting of 7,000 shares at $100, bearing 7 per cent, will be issued. Another series of $600,000 preferred, paying 6 per cent, will be put out. A similar issue is outstanding. There will be 10,000 shares of common of $100 each, as compared with 700,000 authorized at present.



MACHINE TESTS GEAR—The gear under test is set in an iron base. A sharp steel blade is inserted between two teeth. The blade is at the end of a heavy steel arm which extends out into the path of a pendulum-like weight. When the weight falls, it drives the blade through the tooth. As the weight strikes the gear the dial at the top records the "left-over" energy. The machine is used in the Dodge Bros. laboratories.

Dalley Interested in Boston Agency—Edward M. Dalley, proprietor of the Paige Motor Car Co. in New York, has bought an interest in the agency at Boston, which has been reorganized.

Gas Saver Co. Voluntary Bankrupt—The Standard Gas Saver Co., Racine, Wis., has filed a voluntary petition in bankruptcy in the federal court at Milwaukee. Liabilities are scheduled at $5,460 and assets at $470.

Anger Co. to Expand—The Anger Engineering Co., Milwaukee, Wis., which manufactures the A. E. C. custom built cars and operates a large service shop, has completed arrangements for the establishment of a new plant in Milwaukee.

Huette Concentrates Business—Gustave Huette, president of the Falls Motors Corp., Sheboygan Falls, Wis., which was recently reorganized from the Falls Machine Co., has sold the Northern Furniture Co., Sheboygan, which he founded in 1880, for $500,000. Mr. Huette retires from the furniture business to devote his entire time and attention to the big motor works.

Lyon to Be K. C. Manager—Newell Lyon, for 3 years general sales manager in New York state for the White Co., has been made manager of the Kansas City branch of the company, recently established after the purchase of the Kansas City White Co. from J. H. Toole. Mr. Toole is now taking a vacation, and his future plans are not announced, though he may be connected with the branch.

Torbenson Elects Eaton G. M.—J. O. Eaton, formerly treasurer of the Torbenson Axle Co., Cleveland, O., has been elected general manager.

Nichoalds Co. Does Jobbing—The Nichoalds Co., Detroit, for many years dealer in motor car parts and accessories, has entered into the jobbing business.

Fisher Body Corp. Expands—The Fisher Body Corp., Detroit, has purchased the factory of the Regal Motor Car Co., which is located opposite its main plant. The Regal unit is already in operation.

Kissel Company Makes Addition—The Kissel Motor Car Co., Hartford, Wis., is building an auxiliary assembly shop of concrete and brick. This will add 4,000 square feet to its floor space.

Spring Wheel Co. Plans Factory—The Gerleit Auto Spring Wheel Co., New York, is to build a plant for the manufacture of a patented flexible steel wheel with solid rubber tires. It will be located at Jersey City, N. J.

Hayes Wheel Co. Increases Capital—The Hayes Wheel Co., Jackson, Mich., has increased its capitalization from $1,000,000 to $1,500,000. The increased fund will be used for additional machinery and equipment for the manufacture of wire wheels.

Wheel Company to Consolidate Plants—The Kelsey Wheel Co., North Memphis, Tenn., and Detroit, Mich., will consolidate its factories, bringing the Detroit plant to Memphis. This will increase the capacity of the Memphis plant, which now produces 2,000 complete motor car wheels daily.

Body Mfg. Co. Has Fire Loss—Damage estimated at $40,000 was sustained by the Haberer Auto Body Mfg. Co., Cincinnati, O., recently in a fire that started from the drying room, where large quantities of lumber were burned. A freight train switching across a street delayed the fire company nearly 10 minutes, and it was necessary to stretch hose for a mile.

LeBlond to Dearborn Truck Co.—N. L. LeBlond, formerly secretary and general manager of the Hannibal Motor, Wagon and Body Co., Hannibal, Mo., has been made western manager of the Dearborn Motor Truck Co., and will make his headquarters at Kansas City. Augustine Gilmore, formerly of Chicago, succeeds LeBlond in the Hannibal company as general manager.

Briscoe Plans Coast Plant—The Benjamin Briscoe Motor Co. is to establish an assembly plant in Los Angeles. This policy is in line with that adopted by the Ford, Overland and Chevrolet companies. The last named has an assembly plant at Oakland, Cal. The importance of the Pacific coast is beginning to be realized more and more by the trade, and a state that has an average of one motor car to every fifteen inhabitants is not likely to be overlooked.

Olds Motor Works Expands—Expansion of the Olds Motor Works in preparation for the manufacture of 20,000 cars next year involves a 50,000-square-foot addition to the working floor space of the plant. The capacity of the loading platforms is being doubled, and new railroad sidings are to be built. A number of additions to the metal working department already have been made, and new machines have been installed to increase the production of fenders and other parts. The installation of an additional

enameling plant is contemplated. Rearrangement has doubled the capacity of the battery charging room.

Auto Tire Co. to Build—The Racine Auto Tire Co., Racine, Wis., has purchased a site for a new $100,000 plant. Plans for the buildings have been made, and the construction will be carried on through the winter.

New Manager for Bearing Company—E. J. Watkins, formerly with the Dayton Metal Products Co., Dayton, O., has been appointed works manager for the George Automatic Roller Bearing Co., Cincinnati, O.

Open Baltimore Factory Branch—The Kelly-Springfield Tire Co. has opened a factory branch in Baltimore, Md. H. H. Grobe, formerly manager of truck tire sales at the New York branch, is manager.

To Join Burd Ring Co.—H. H. Cobe and C. F. Coe, formerly assistant superintendent of inspection and production purchasing agent, respectively, for the Curtiss Aeroplane Co., Buffalo, have joined the Boston branch of the Burd High Compression Ring Co.

To Sell New Dimming Device—The Edward A. Cassidy Co., a selling corporation, New York, has been appointed sales division for the Corning Glass Works, Corning, N. Y., manufacturer of the Corning Conaphore, a new device for eliminating glare in motor car headlights.

Collard and Gillette Join Selden Force—Chas. E. Collard, formerly Philadelphia branch manager of the Chase Motor Truck Co., and Chas. N. Gillette, southern division sales manager in the same organization, have left the company to join the Selden Truck Sales Co., Rochester, N. Y. Mr. Collard becomes division sales manager in the Philadelphia territory, while Mr. Gillette assumes the same position in the southern territory, with headquarters at Charlotte, N. C.

Monarch Buys Iron Works—The Monarch Tractor Co., Chicago, has taken over the John Dornfeld Iron Works, Watertown, Wis., which in recent months has been devoted to the manufacture of farm tractors and sugar cane harvesting machinery. The Monarch company, a South Dakota corporation, is capitalized at $250,000 and now has more than $400,000 worth of orders booked. The tractor is styled the Never-Slip and is built in sizes from 6 to 50 horsepower. The 45 horsepower type is used as the motive power of the Luce sugar cane harvester, an 11-ton machine which does the work of 40 to 60 men on sugar plantations.

Burgess Leaves Dorris Company—William L. Burgess has resigned as sales manager of the Dorris Motor Car Co., St. Louis, Mo., and is now manager of sales for the Efficiency Oil Corp., St. Louis.

Selden Holds Sales Conference—The first conference of division sales managers and prospective division managers was held at the general offices of the Selden Truck Sales Co., Rochester, N. Y., November 2-4. Twelve representatives attended.

Mitchell Adds Loading Tracks—Though the Mitchell-Lewis Motor Co., Racine, Wis., already has more than 3 miles of loading sidings on its property, it has been found necessary to add 2½ miles more to get out the shipments. The factory is working night and day to catch up with orders.

Franklin Manager Heads Club—W. F. Kneip, manager of the Franklin Motor Car Co., Baltimore, Md., has been elected president of the Baltimore Automobile Dealers' Association. C. H. Reeves, Jr., of the Foss-Hughes Co., was elected vice-president, and E. S. Bliven of the Standard Motor Co., secretary and treasurer.

New Apperson Agency in Denver—The Mollman-Mulconnery Motor Co., formerly of Colorado Springs, has obtained the distributing agency for the Apperson motor car in Colorado, Wyoming and New Mexico, taking the place of the Thorney Auto Co., former agent. A sales and service station has been established in Denver.

Brooks to Madison Plant—H. H. Brooks has been appointed superintendent of agencies for the Madison Motors Co., Anderson, Ind. Brooks was one of the incorporators of the Marathon Motor Works, Nashville, Tenn., and was connected later with the Wayne Works, Richmond, Ind., and the Pontiac Chassis Co., Pontiac, Mich.

Packard Staff Changes—A. E. Gluck, former purchasing agent for the Packard Motor Car Co., New York, has resigned to become president and general manager of the Abbott Motor Equipment Co., New York, distributor for the Warner lens, Block mirrorscopes, Amsco jacks and Twombly foot pumps. S. S. Frankenstyne remains as treasurer and sales manager. H. T. Stevenson succeeds Mr. Gluck as Packard purchasing agent, thus while W. C. Lyons takes up his work as head of the accessory department.

Millikan Plant Has Fire Loss—Fire originating in a dry kiln damaged the motor car parts factory of G. W. Millikan, Muncie, Ind., $20,000 recently.

Obenberger Co. Makes Shipment—The John Obenberger Co. has made its first shipment of drop forgings from its new plant at West Allis, Wis. The offices have been moved from Milwaukee to West Allis.

Whitman to National Company—F. H. Whitman, formerly with Dodge Bros., Detroit, has been appointed production engineer of the National Motor Vehicle Co., Indianapolis.

Wayne Cheers New Factory—Wayne, Mich., had a holiday lately. It was a civic holiday and celebrated the start of the building operations of the Harroun Motors Corp. factory. Work on the new plants has just begun.

Firestone Company Elects—F. J. Firestone was elected vice-president of the Firestone Tire & Rubber Co., Akron, O., at its annual meeting. A. G. Partridge, formerly assistant sales manager, succeeds Firestone as general sales manager. F. C. Blanchard was elected manufacturers' sales manager.

Carriage Builders Join N. A. C. C.—Brewster & Co., carriage builders for half a century or more and who 2 years ago began to make a car equipped with a Knight engine, have been admitted to membership in the National Automobile Chamber of Commerce. The Brewster plant is located at Long Island City, N. Y.

Fulton Co. Gets New Line—The Fulton Co., Milwaukee, Wis., manufacturer of motor car accessories, has taken over for selling the entire output of the C. & E. Mfg. Co., Marshalltown, Ia. The new line includes cutouts, foot pedals and various Ford accessories. The Fulton Co. will sell to the jobbing trade in the United States and Canada.

New Used-Car Sales Plan—To accelerate the movement of used Studebakers, one Wisconsin distributor, the John G. Wolleager Co. of Milwaukee, gave a coupon book good for 25 hours' free service with each used car sold. At the prevailing rates of garage labor, 65 to 75 cents, the bonus was worth from $16 to $20. Large sales were obtained

Recent Incorporations

Albany, N. Y.—Premier Motor Corp.; capital stock, $4,150,000.

Beaver, Pa.—Lincoln High Garage Co., to engage in garage and motor car service business; capital stock, $5,000; incorporators, George P. Burlett, Roy Campbell and Harry Plaff.

Boston, Mass.—McCarthy, Meyer Motor Co.; capital stock, $25,000; incorporators, John T. McCarthy, Isadore Meyer and Clarence Tichell.

Boston, Mass.—J. H. and G. L. Atwood, Inc.; capital stock, $50,000; incorporators, J. Harold Atwood, George L. Atwood, and J. Clifford Atwood.

Buffalo, N. Y.—Superior Rubber Co.; capital stock, $25,000; incorporators, Elmer W. Hagmaier, Frank A. Abbot, George J. Hagmaier, A. V. Purnell, William E. Standler and Edward Heer.

Chicago, Ill.—Seng Auto Device Co.; capital stock, $50,000; incorporators, William H. Dillon, Leroy Hackett and John T. Evans.

Chicago, Ill.—Englewood Tire and Supply Co.; capital stock, $5,000; incorporators, F. F. Symonds, John H. Cadmus and Oliver H. Starrett.

Cincinnati, O.—Dixie Auto Co.; capital stock, $5,000; incorporators, Lee B. Wise, Bryant S. Butterfield, Frank A. Menninger, Morris J. Dale and C. B. Stubert.

Cincinnati, O.—Conejos Rubber Co.; capital stock, $100,000; incorporators, Edward D. Woodward, C. F. Albrecht, Madison P. Holland, Eugene Schmidt and Frank Kirk.

Cleveland, O.—Cleveland Auto Parts Co., to manufacture parts; capital stock, $100,000; incorporators, M. T. Evans, J. F. Lannert, Henry F. Koch and James A. Farrell.

Cleveland, O.—Blake Motor Trucking Co., to do a trucking business; capital stock, $50,000; incorporators, R. W. Blake, A. D. Benden, Emil John, Emery Breasler and Harriet Blake.

Cleveland, O.—Non-Deflating Inner Tube Co., to sell tires and tubes; capital stock, $100,000; incorporators, J. A. Sullivan, Henry Roegge, W. A. Stockman, Marie D. Wagner and John A. Elden.

Cleveland, O.—A. B. C. Auto Livery and Garage Co., to operate a taxicab company; capital stock, $10,000; incorporators, A. J. Putka, Timothy Metzger, Fred C. Evers, George A. Putka and Edward J. Putka.

Cleveland, O.—Garwood Motor Car Co., to sell motor cars; capital stock, $10,000; incorporators, F. O. Garwood, M. C. Faunce, L. F. Weinsz, F. E. Sturtevant and H. E. Elliott.

Cleveland, O.—Collier Co., to deal in motor cars; capital stock, $10,000; incorporators, William Wisner White, Robert S. McCreary, T. H. Garry, N. B. Snavely and J. R. Davock.

Cuyahoga Falls, O.—Meyer Rubber Co.; capital stock, $100,000; incorporators, Fred W. Nachtel, Philip B. Treash, Ernest L. Mallory, W. S. Nicodemus and E. J. Kidwell.

Danville, Ky.—Danville Motor Co.; capital stock, $5,000; incorporators, T. F. Durham, D. W. Mahan and J. W. Mitchell.

Detroit, Mich.—Detroit Motor Lock Co., to manufacture and license others to manufacture motor cars; capital stock, $30,000; incorporators, Charles R. Kerns, George M. Conner and R. W. Muir.

Fort Wayne, Ind.—Becker Motor Co., to deal in motor cars; capital stock, $5,000; incorporators, W. S. Becker, C. H. Becker and Leon B. Merritt.

Harrisburg, Pa.—Church Lane Garage Co.; capital stock, $50,000; treasurer, John V. Cummins.

Milwaukee, Wis.—Car Lighting Improvement Co., to manufacture and sell Watson car lighting devices; capital stock, $25,000; incorporators, T. H. Spence, Julian Olds and John A. Dietrich.

Minneapolis, Minn.—Elgin Motor Sales Co.; capital stock, $20,000; incorporators, H. S. Baker, R. G. Rowland and G. S. Bannon.

Minneapolis, Minn.—Carlson Motor Car Co., to handle KisselKars in the Northwest; capital stock, $50,000; incorporators, W. T. Carlson, H. W. Haverstock and E. A. Carlson.

Montreal, Canada.—Roger Co., Ltd., to deal in motor cars; capital stock, $250,000.

Nashville, Tenn.—Shockley Motor Co.; capital stock, $1,000.000.

Philadelphia, Pa.—Barnes Motor Co., to engage in the business of buying, selling and trading in motor cars and supplies; capital stock, $25,000; incorporators, Lucy S. Barnes, Florence W. Kleckner and Thomas M. Lewis.

Portland, Ore.—Hudson-McConochy Co., to deal in motor cars; capital stock, $10,000; incorporators, S. E. Hudson, L. W. Hudson and Homer McConochy.

Seattle, Wash.—Angeles-Marshall Auto Co.; capital stock, $25,000; incorporators, F. A. Verdofer, A. L. Marshall and H. H. Guth.

Seattle, Wash.—Washington Tire Co.; capital stock, $7,500; incorporators, C. H. Magnussen and Phil G. Duvall.

St. Paul, Minn.—Star Rubber Co.; capital stock, $25,000; incorporators, J. C. Spillane, S. H. Greeley and J. W. Laramy.

Toronto, Ont.—A. D. Garrie & Co., Ltd., motor car agents; capital stock, $40,000.

Vermillion, O.—Dall Motor Parts Co.; capital stock, $35,000; incorporators, F. P. Penning, E. G. Connelly and S. A. Dall.

Vermilion, O.—Dall Motor Parts Co.; $35,000; to manufacture motor car parts; F. P. Penning, W. E. Derr, C. F. Decker, E. G. McConnelly and S. A. Dall.

Youngstown, O.—Charters Motor Sales Co.; $10,000; to sell motor cars; incorporators, Harvey J. Charters, Jared P. Huxley, James Guttridge, C. B. Klingensmith and Eva Pearce Charters.

From the Four Winds

WHAT Minnesota Spends—In 1915 the road expenditure in Minnesota was $8,292,000, of which there was spent under direction of the state highway commission of state funds $1,580,000. In 1904, the year before a state road law was passed, the total spent on roads was $1,607,417. Minnesota is twelfth in the list of states in road expenditure.

Scenic Highway Association Now—The Minnesota Scenic Highway Association has filed articles of incorporation, headquarters at Brainerd. The road will start from the Twin Cities, run to Elk river and loop through the northern part of the state back to Elk River. It will go as far north as International Falls, Baudette and Spooner on the Canadian boundary.

Diagonal Trail Organization—The Peoria, Bloomington and Danville, Ill., division of the Diagonal trail was organized recently. The trail is now organized in four divisions, extending from Deadwood, S. D., to Florida. The first division, the Cedar Rapids, extends from Iowa Falls to Spirit Lake; the second, through Illinois to Peoria. Eventually it is hoped to extend the trail as far west as Seattle and as far southeast as Miami.

Pennsylvania Dedicates Highways—The William Penn highway, which runs from Pittsburgh to Easton, was formerly dedicated and opened November 2 by Governor Brumbaugh and other officials. The new concrete highway between Bethlehem and Easton also was opened. Charles M. Schwab, the steel magnate, presided over the ceremonies. A bill is to be introduced into the next legislature, providing that all fees derived from the sale of licenses would be turned over to the state highway department for the construction and maintenance of new roads. The bill will also provide for an annual appropriation of $5,000,000 to the department for this purpose.

Canadian Activities Planned—Work on the Ottawa-Prescott highway, Canada, on which surveys have now been completed, is expected to commence next spring. The cost will be approximately $600,000, of which amount the city of Ottawa will pay $80,000 and each township $3,000 per mile. A change is to be made from the original route. Instead of cutting through the township of Augusta, as was proposed, the highway will swing east, leaving the old Prescott route and running to the Johnstown road, which it will follow down to the St. Lawrence. Then there will be a 4-mile ride along the banks of the river to the town of Prescott. The route will cover a distance of about 62 miles.

Milwaukee County Builds Roads—Milwaukee county, Wis., added 20.35 miles of 16-foot concrete road and 3.03 miles of 40-foot asphaltic highways to its already large total of approximately 100 miles during 1916. The total expenditure for the 1916 season is $520,984. Concrete road construction cost $338,084; asphalt roads, $122,800, and bridges and culverts, $60,000. The completion of 1916 work on November 1 gives Milwaukee county approximately 125 miles of permanently improved roads, all of which are outside the limits of cities. The first work on the county loop, requiring 40 miles of roadway to connect the long stretches previously built in main roads, was done this season. It is expected that the loop will be completed by the end of 1917. Since 1912 Milwaukee county has expended in the neighborhood of $2,000,000 for the permanent improvement of highways, and all the work has been paid for out of current funds. Not one cent of bonded indebtedness has been incurred, nor do future plans contemplate any bond issues or other deferred payment method.

Good Roads Rally Planned—Good roads enthusiasts planned a rally for November 10 at Amory, Miss., to arouse interest in the proposed routing of the Bankhead highway, which runs from Memphis through Birmingham to Atlanta, through that place. A meeting was also held at Macon, Ga., November 9 to perfect plans for the Georgia branch of the highway. Hundreds of letters are received by the secretary of the highway association just now, asking that when the scouting parties who are to select the best routes between the larger cities begin their tours they will be sent to the various towns from which the letters come.

With the Motor Clubs

Philadelphia Club Hears Talk—The Automobile Club of Philadelphia has arranged for a series of talks during the next few months. The first lecture was given by Charles E. Duryea, a pioneer in the field, who spoke on the history of motor cars, motors, power transmission, ignition and carburetion.

Ohio Club Elects—The East Liverpool, O., Automobile Club has elected George McClintock, president; Lyman Rinehart, vice-president and Samuel Groglode, secretary-treasurer. A committee has been named to confer with the city solicitor with reference to a new traffic code.

Drivers Form Association—The New Bedford, Mass., Automobile Drivers' Association has just been organized with officers as follows: President, H. O. Whitehead; vice-president, Arthur Morrow; treasurer, Mitchell Green; secretary, James Culhane; investigating committee, J. McCarthy, S. Hesler and G. Howland.

Albuquerque Club Formed—The Automobile Club of Albuquerque has been organized at Albuquerque, N. M., to promote good roads work and other activities in the interest of motoring in New Mexico. The officers are Max Nordhaus, president; George Rosling and E. C. Butler, first and second vice-presidents; Ed T. Chase, secretary.

Mellen, Wis., Forms Club—The Mellen, Wis., Automobile Club has been organized with J. D. Twomey as president and A. G. Meredith as secretary and treasurer, to cooperate with the Automobile Club of Ashland, Wis., and other organizations in the cause of good roads. The new club is fostered by the Mellen Commercial Club, with which it will have its headquarters.

New Jersey Club Plans Run—A 24-hour endurance run will be held by the New Jersey Automobile and Motor Club, Newark, N. J., on November 24 and 25. The run will start and end in Newark, and the course will be through North Jersey, covering 250 miles. The competing cars will be divided into two classes. One class will be composed of touring cars and the other of runabouts.

Missouri Clubs Unite—Kansas City, St. Joseph and Sedalia clubs have already joined a united movement toward a state system of rock roads, standard traffic regulations, suppression of car thefts, etc., for Missouri. Promoters of the Missouri State Automobile Association met with the officers of the Automobile Club of St. Louis to outline statewide activities. Members of the Kansas City, Pettis County, Sedalia and St. Louis clubs were represented.

Club Wants New Members—The Automobile Club of Southern California, one of the best known and largest in point of membership, is waging an active campaign for new members. The membership now is less than 10,000, though there are 60,000 cars in Los Angeles county. The club does not confine its work to Southern California only but has signed the Santa Fe trail as far east as Chicago, penetrated the high Sierras with its road crews to Ely, Nev., and trailed the deserts of Arizona.

K. C. Club Has Housewarming—The Automobile Club of Kansas City, the membership of which has been increased to more than 1,400 within the last year, formally opened its new club house at Hickman Mills with a dinner dance October 31. The house is new in the addition of a second story and the remodeling of the lower story. On the second floor is a large ballroom, which can be used for private parties. The ballroom on the first floor will continue to be available for the usual general gatherings.

Coming Motor Events

RACES

—1916—

*November 16—Vanderbilt cup race, Santa Monica, Cal.
November 18—Track races, Phoenix, Ariz.
*November 18—Grand prize race, Santa Monica, Cal
*November 30—Speedway, Los Angeles, Cal.
November 30—Speedway, Uniontown, Pa.
*December 25—Speedway, Los Angeles, Cal.

—1917—

May 19—Metropolitan Trophy, New York speedway.
†May 30—Indianapolis speedway.
†June 9—Chicago speedway.
June 23—Cincinnati speedway
†July 4—Omaha speedway.
†July 14—Des Moines speedway.
†July 28—Tacoma speedway.
August 4—Kansas City speedway.
†September 3—Cincinnati speedway.
†September 15—Providence speedway.
†September 29—New York speedway.
October 6—Kansas City speedway.
October 13—Chicago speedway.
October 27—New York speedway.

* Sanctioned by A. A. A.
† A. A. A. championship events for 1917.

MEETINGS

December 7-9—Annual convention, Safety First Federation of America.
January 9-11—Mid-winter meeting, Society of Automobile Engineers.
November 20-25—Worcester, Mass., show.
December 2-9—Springfield, Mass., show.
December 7-9—Pasadena, Cal., show.
December 30-January 6—Cleveland, O., show.

SHOWS

December 18-20—San Francisco show.
January 2-10—Salon, Hotel Astor, New York.
January 6-13—New York show.
January 9-10—Fort Dodge, Ia., show.
January 13-27—Montreal, Can., show.
January 13-20—Montreal show.
January 20-27—Detroit show.
January 22-27—Oklahoma City show.
January 22-27—Rochester, N. Y., show.
January 23-27—Baltimore show.
January 27-February 3—Chicago show.
January 29-February 3—Buffalo show.
February 3-10—Minneapolis show.
February 10-17—San Francisco show.
February 12-17—Kansas City show.
February 18-25—St. Louis, Mo., show.
February 19—Pittsfield, Mass., show.
February 19-24—Des Moines, Ia., show.
February 19-24—Duluth, Minn., show.
February 26-March 3—Omaha, Neb., show.
March 3-10—Boston show.
March 6-10—Fort Dodge, Ia., show.
March 14-17—Davenport, Ia., show.